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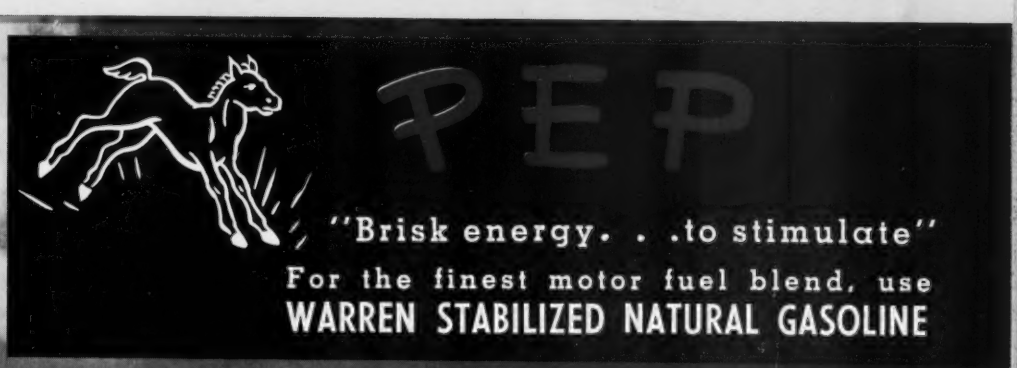

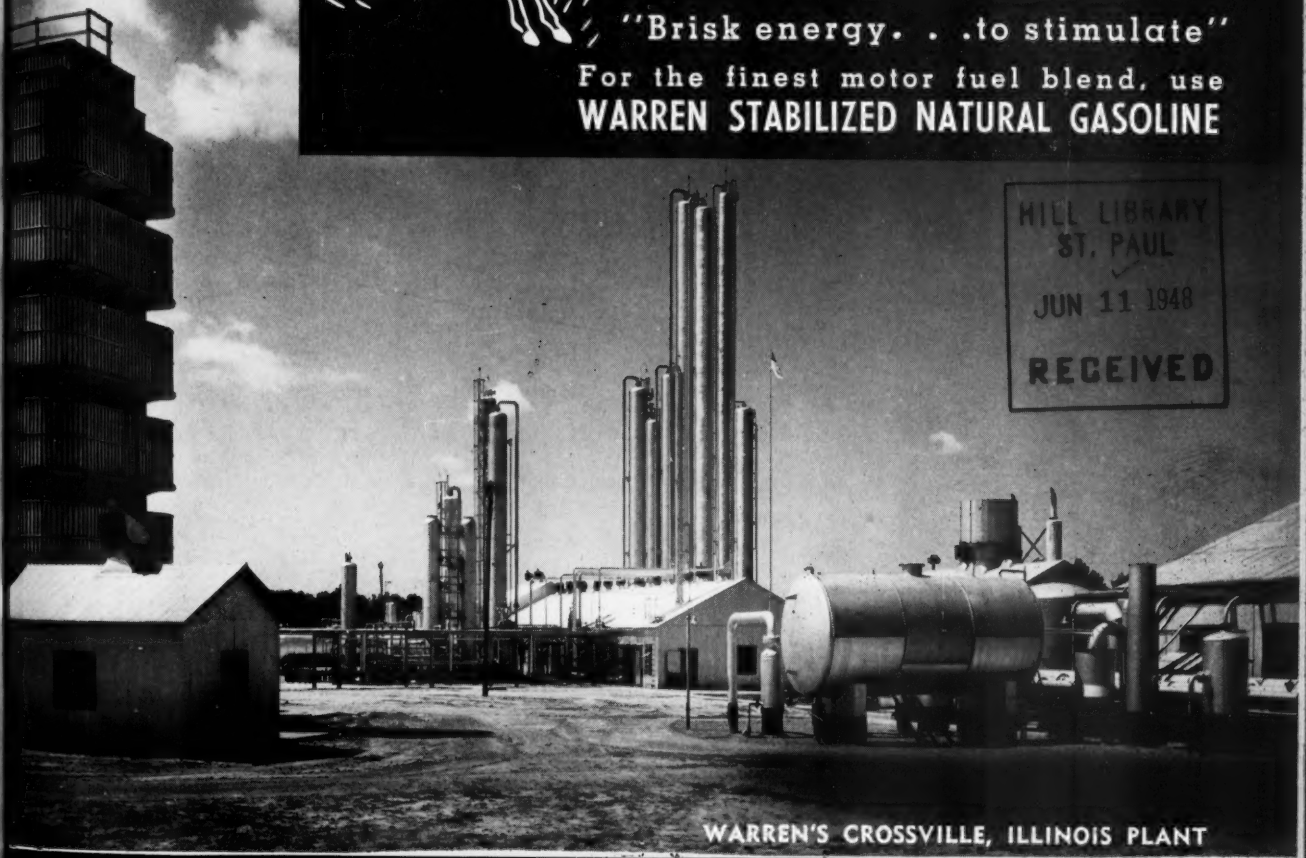

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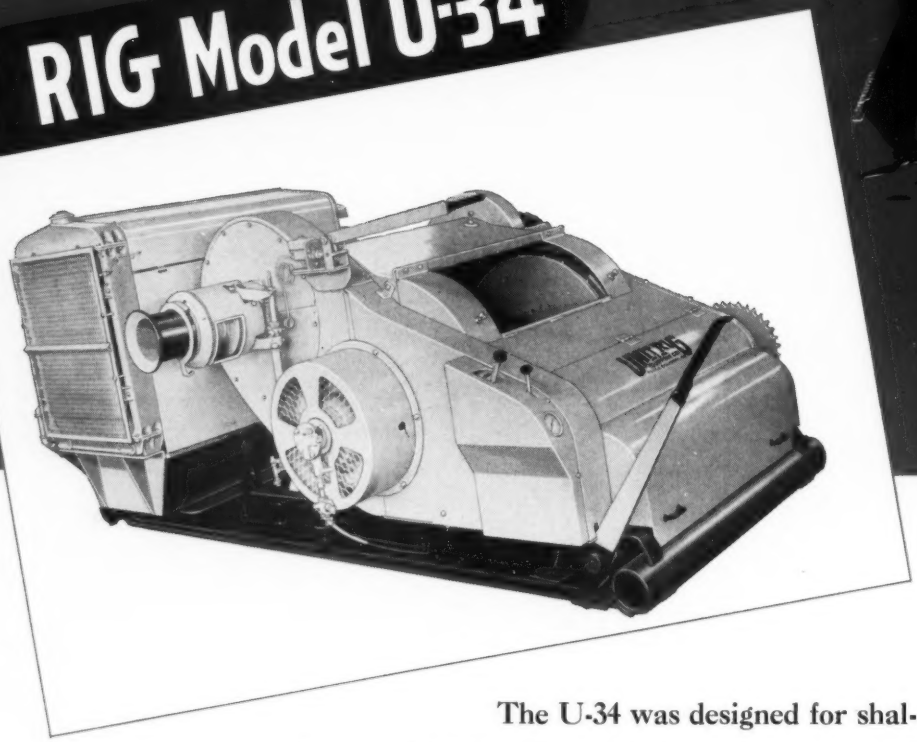
UNIT RIG Model U-34



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CLEAN UP THE "WORKING SURFACE" OF YOUR CASING

Read these facts about the Baker Rotary Casing Scraper

Have you ever tried to run testing tools or a swab, and had the rubber packing unit or the rubber cups so badly cut, torn and mutilated that the run was a failure? The chances are that trouble was caused by burrs from gunshot holes or by the sheath of hardened cement or mud which remains on the inside walls of casing, even after a bit of maximum possible gauge has been used to drill out after a cement job.

Until quite recently there was no fast, simple method of overcoming these difficulties. Now, however, it is truly a waste of time, temper and money to leave any obstructions adhering to or protruding from the "working surface" of your casing. The Baker Rotary Casing Scraper quickly, positively and economically removes *all* obstructions from the inside walls of casing, leaving the surface clean and smooth—ready for *immediate* testing and completion—and in good condition for any remedial or work-over operations *one year or ten years in the future.*

STRONG, SIMPLE CONSTRUCTION

The Baker Rotary Casing Scraper consists of a strong body in which three long, reamer-type, hard-faced blades are vertically mounted. These three blades form an expansible reamer due to the fact that they are pressed outward against the inside walls of the casing by a number of coil springs. This self-equalizing feature insures constant, uniform contact with the walls of the casing, and is one of the secrets of the clean, smooth scraping action. Hard facing is applied in a flat, rectangular recess to form the long cutting edge of each blade, and a worthwhile amount of scraping can be done before the blades are dulled.

Ample circulating areas permit free disposal of cuttings; the streamlined exterior of the body insures ease in running-in; and if by accident the Casing Scraper is run out of the lower end of the casing, there is no difficulty in bringing it back inside for removal from the well.

FACTS ABOUT ITS USE

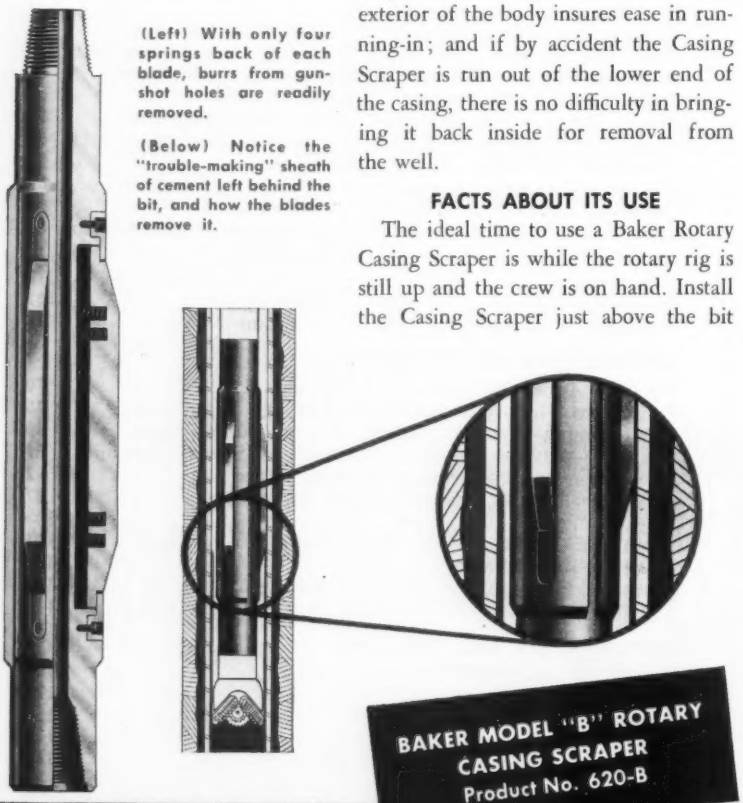
The ideal time to use a Baker Rotary Casing Scraper is while the rotary rig is still up and the crew is on hand. Install the Casing Scraper just above the bit when going in to drill out the cement shoe. Even when a bit of the maximum possible gauge is used for drilling-out, a thin, hard sheath (or skin) of cement will still remain adhering to the inside walls of the casing. The Baker Rotary Casing Scraper removes not only this hardened sheath of cement, but also scrapes away all mill scale, and smooths out rough areas. The inside of the casing is left clean and smooth, ready for trouble-free, down-hole work immediately thereafter, or at any future time.

If the well is gun perforated, then a second run of the Baker Rotary Casing Scraper will remove any burrs left around the gun-shot holes. The slight additional cost of this second run is negligible when you consider what the clean, smooth casing will mean when any future down-hole work is done.

If at a later time, after the rotary has been removed, obstructions on the inside walls of the casing interfere with operations, the Baker Rotary Casing Scraper still can be employed successfully. By running the Casing Scraper on tubing, and rotating manually with tongs, limited areas may be scraped; while several hundred feet of casing have been scraped by rotation of the tubing with an endless spinning rope, or by means of air tongs.

IT'S EASY TO HAVE THE "WORKING SURFACE" OF YOUR CASING IN PERFECT CONDITION

Baker Rotary Casing Scrapers are furnished on a low-cost rental basis in domestic fields, and *your* crews can run them easily and successfully to scrape the "working surface" of the casing before running casing, tubing, liners, swabs, testing tools, cement retainers, packers or other similar tools. It pays off in savings of time, temper and money.—Why not call the nearest Baker service engineer and start enjoying these benefits in *your* wells?



(Left) With only four springs back of each blade, burrs from gunshot holes are readily removed.

(Below) Notice the "trouble-making" sheath of cement left behind the bit, and how the blades remove it.

BAKER MODEL "B" ROTARY CASING SCRAPER
Product No. 620-B

BAKER OIL TOOLS, INC. LOS ANGELES • HOUSTON • NEW YORK

THE OIL AND GAS JOURNAL

Increasing Recovery

THE recent recommendations of the Secondary Recovery Advisory Committee to the Interstate Oil Compact Commission merit thorough study and support by operators. Features of the report were discussed last week at the monthly meeting of the commission's executive committee.

Neither the recovery committee nor the commission is attempting to force upon the oil industry and individual oil states a preconceived program. The commission's functions are entirely advisory and it has always operated with full recognition of the varying political and oil operating conditions within the states.

Even if it were possible to secure public support there is no disposition within the commission to favor state laws which would give the regulatory bodies arbitrary and unlimited powers in the application of secondary and allied projects. It is realized the end result of such a program would be complete control of all phases of oil operations.

But it is becoming increasingly apparent that the needed applications in recovery operations involving the pooling of activities cannot be attained if a small minority is permitted to nullify the sound operating plans of a majority. Numerous cases can be cited in which small interests have insisted on considerations in a unit plan not justified by their operating position.

Because of this minority attitude many large and small programs have been dropped completely or only partially applied. The solution to this problem lies in state legislation which assures full play to voluntary arrangements but which permits regulatory action by state conservation bodies following investigation with protection to all rights involved.

Some states have enacted legislation which, after adjudication, may satisfy all requirements. Other states require supplementary laws before operators can carry out programs based on sound conservation principles.

As plans for new secondary programs are outlined, investigations usually show some form of unitization is needed before additional investments can be justified. Payouts invariably extend over a longer period than do the primary operations. Pressure maintenance, repressuring, and the increasingly important cycling usually require the cooperations of a number of operators before an efficient recovery operation can be applied.

The expansion of all recovery operations has become a must. Their potentialities in recoverable oil is still not fully appreciated by many within the industry. Secondary recovery and associated activities based on unitization are the best answer to those who insist that billions should be spent on a petroleum-substitute industry in order to keep pace with mounting demands for oil products.

Competition and Teamwork Find Oil, Speakers Tell Scouts

DENVER.—Competition was pointed to as the basic reason for the existence of scouts and landmen in the oil exploration of this country by Ira H. Cram, exploration manager for Pure Oil Co., in the feature talk, "Who Finds Oil," before the National Oil Scouts and Landmen's Association here June 3, 4, and 5.

"If the oil business can operate in most foreign lands virtually without scouts and landmen, why must we have as many as 2,000 scouts and more than 3,000 landmen in the United States? The answer lies in the word competition—competition created by the American system of free enterprise and of diversified ownership of the subsoil—the minerals," said Cram. "Competition which developed the American oil industry to world dominance, sired the scouts and landmen and controls their every movement and decision."

In pointing to the need for scouting, Cram said that the "number has increased because the scientific age has multiplied the amount and kinds of data that must be collected and digested by scouts, and has heaped burdens upon the landmen because selective leasing and dealing in the more thoroughly explored and increasingly competitive country is more difficult than random leasing and dealing. In organizing the expensive exploration programs of today, no scrap of available data can be ignored. There is no substitute for the most accurate data possible on drilling wells, on leasing, on movements of exploratory parties such as seismographs, and on any and all phases of operations, including new exploration techniques, secondary recovery, pressure maintenance, unitization, trading practices, pipe lines, politics, or public relations."

Competition Getting Rougher

As to the question, "Who finds oil?" Cram answered that teamwork did, teamwork of each branch of the exploratory departments. He told the scouts and landmen present that "You do—when you play well your position on the team and especially when you convert fumbles into touchdowns. Competition can only get rougher—competition among companies, competition among nations. We face the present and future problem of gleaning more than 2 billion barrels of crude oil per year from our country, which has already been more thoroughly explored than any foreign country. . . . I believe the undiscovered reserve is large—that the evidence afforded by geology and the history of discovery indicates that the end of bonanzas is not in sight."

More than 400 scouts and landmen and their wives attended the 3-day convention. The business and entertainment program was arranged by the convention committee composed of William A. Crutcher, division scout for Carter Oil Co., and Bea McCune, division scout for The California Co. Howard R. Brooks, with Magnolia Petroleum Co., Dallas, and retiring president of the association, presided at the business meetings.

Public Relations Needed

In the presidential address Brooks reviewed the activities of the group and pointed to the fact that the association's Year Book has now become a standard work of more than 900 pages, reviewing oil development in all parts of the United States. Brooks emphasized the need for the present industry public-relations program as a means of fully informing the general public of oil-industry problems. Two principal points were discussed: First, that "Petroleum Is Progressive" and, second, the highly competitive nature of the oil business.

Officers for the coming year were announced as follows: Simon Crites, Phillips Petroleum Co., Corpus Christi, Tex., president; W. H. Pontius, Ohio Oil Co., Midland, Tex., first vice president; Robert Wilson, Sun Oil Co., Houston, second vice president; O. L. McNew, Amerada Petroleum Corp., Casper, Wyo., third vice president; Howard Pierce, Midstates Oil Corp., Wichita, secretary-treasurer; and R. C. Brown, Union Sulphur Co., San Antonio, editor-in-chief of the Year Book. E. J. Raisch in the national headquarters at Austin is general secretary of the association.

Russell Cameron and Homer Ballinger of the Bureau of Mines oil-shale demonstration plant at Rifle, Colo., presented a paper to the convention on "Oil-Shale Resources, Mining and Processing." The report was very complete and included slide pictures of the process now in use in the plant at Rifle. Ballinger pointed out that the shale oil of Colorado, Wyoming, and Utah represent a reserve many times the total amount of petroleum produced since the inception of petroleum production.

"The problems still facing those who would establish an oil-shale industry are large, but not unsurmountable," Ballinger said. "There is a great deal of encouragement to be found in the work already done. Oil shale in the United States represents the second greatest known source of stored-up energy. Coal is the largest. The peace of mind of its people with regard to a continuing supply of liquid fuels contained within its boundaries will increase when shale-oil fuels take their place beside those from petroleum."

Law Extends Public Land Options

WASHINGTON.—President Truman last week approved legislation amending the Leasing Act to provide that options taken prior to June 1, 1946, may be exercised until August 8, 1950.

The 2-year extension for the exercise of options provided in the measure is aimed at the relief of many persons and oil companies operating under the act who have been unable to commence work on the land because of shortages of labor, steel, and other supplies, and inability to complete geophysical work because of bad weather and other conditions beyond their control.

In a report by the House public lands committee it was pointed out that the general provisions of the Leasing Act and the Interior Department regulations hamper operations on government land, and to offset some of the hindrances a policy of taking options, or applications for leases, was devised under which geological exploration work could be undertaken and if favorable conditions existed the optionee could acquire the lease or operating rights thereunder by exercising the option. An amendatory act of August 8, 1946, recognized and authorized this system and gave holders of options taken prior to June 1, 1946, until August 8, 1948, in which to exercise them.

"Possible losses under the present law would be suffered by major operators, of course," the committee said, "but the small operators, who limit their investments to one or two projects, are faced with a dark financial future unless this legislation extending the time limit for 2 years is enacted. The federal Government will lose nothing through the enactment of this bill. On the other hand, the consequences could be such as to dislocate industry in a manner that might have considerable effect upon the national economy."

Electricity and Radio Use in Oil Increasing, Groups Hear

by George Weber

DALLAS. — The expanding role played by electricity in serving the oil industry was reviewed and previewed by members of the Petroleum Industry Electrical Association, meeting here June 1-3 for their twentieth annual conference. Concurrently, the Petroleum Electric Power Association and Petroleum Electric Supply Association met to present new adaptations of purchased electric power and the latest developments in communication, control, and energy utilization.

Improvements in radio and wire communications, offering greater efficiency and suggesting new adaptations for all phases of contact, highlighted the sessions. "Communications by Micro Radio Waves," a discussion and demonstration presented by Dr. J. O. Perrine, assistant vice president, American Telephone & Telegraph Co., outlined the use of electromagnetic waves with frequencies on the order of 10,000 megacycles and wave lengths measured in inches. Advantages of small physical dimensions for apparatus, frequency difference, and beaming ability were pointed out, and operation of an 8,000-megacycle relay from New York to Boston using a 2° beam was described and pictured. Micro radio waves, like those in the very high -frequency class, offer promise of further room on the crowded short-wave spectrum, as new techniques make their use practical.

Radio Allocation Foreseen

A graphic demonstration of facsimile accompanied the report of pictorial transmission by wire or radio, by K. A. Regel of Automatic Electric Sales Corp. While this rapid means of sending accurate, legible reproductions of records, photographs, maps, charts, sketches, blueprints, etc. holds comparatively less interest for petroleum than for some other industries, such as the press, the availability and ease of operation of this new medium were brought home to the communications representatives of 35 major and independent oil companies. Facsimile fundamentally involves the scanning of an area of letter - size width and uplimited length, and converting various shades of color to electric impulses. Transmitted over any wire circuit or radio channel capable of handling voice transmission, these impulses are reconverted to a black-gray-white reproduction of the original at the rate of 14½ sq. in. of copy per minute.

Petroleum's place in industrial radio usage was reviewed by two authorities on that timely subject. F. W. Littell, superintendent of Shell Pipe Line Co.'s telephone and telegraph department, reported on the American Petroleum Institute central committee on radio facilities, of which he is chairman. In this matter, members of P.I.E.A. have a close working knowledge and interest, since it was that group which originally represented the entire industry before the Federal Communications Commission in the early days of radio usage, and was able eventually to interest the A.P.I. in assuming the role as efforts to obtain a representative block of the radio spectrum became increasingly necessary.

Littell reported on his committee's efforts during the past year in presenting the industry's strong case for more frequency allocations.

Joseph H. Wofford, consulting engineer in radio communications, Houston, further reviewed the industry's present unsatisfactory position in obtaining proper and adequate frequency allocation reasonably free of interference. He cited the rapid adoption of radio, particularly in the drilling and production divisions, and made estimates of what may be expected in the future.

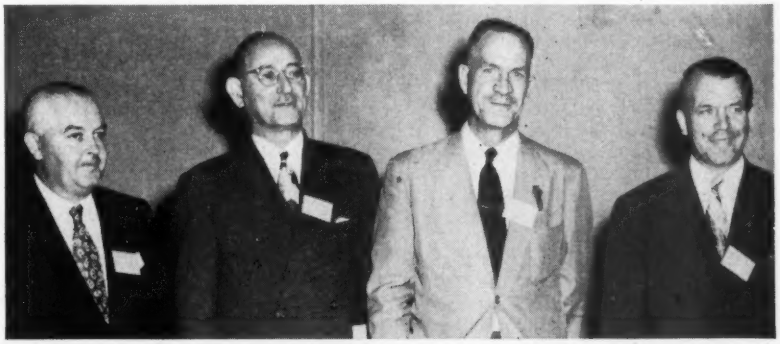
More Energy From Coal

On the broad subject of energy sources, C. A. Powell, assistant vice president in charge of engineering, Westinghouse Electric Corp., reviewed present-day estimates of coal, oil, gas, and shale-oil reserves and prospects for future employment of hydro-power and nuclear fission, concluding that by the end of this century the United States will probably obtain 90 per cent of its total energy requirements from coal.

In reviewing "Some New Equipment for the Petroleum Industry," T. R. Rhea, manager, chemical and petroleum division, engineering department General Electric Co., drew attention to the same expected reversal of recent trends to petroleum and natural-gas consumption at the relative expense of coal. He referred to the increase in electrification of pumping leases and predicted the expended use of electric power for drilling rigs. In the latter use, he saw future fields completely developed with electric rigs, served with power-line network transmitting purchased power or locally generated power from portable central stations. New controls and motor applications in pipeline and refining operations were briefly reviewed.

T. E. Swigart, president, Shell Pipe Line Corp., Houston, was feature speaker at the association's annual dinner. With a discussion of pipe-line history as background he brought out current trends in pipe-line practices: joint ownership and operation, larger lines, closed systems, and efforts to lower operating costs.

Total registration at the joint meeting exceeded 375. Petroleum Electric Supply Association elected the following new officers: E. C. Lyle, Westinghouse Electric Supply Co., Houston, chairman, board of directors; C. A. Heiser, Anaconda Wire & Cable Co., Dallas, president; Carl Mullen, Nelson Electric Supply Co., Tulsa, vice president; and Nathan Jolliff, Crouse-Hines Sales, Dallas, secretary-treasurer. Current Petroleum Electric Power Association officers continue in office until the annual fall meeting.



The Petroleum Industry Electrical Association includes in its membership representatives of more than 35 pipe line, producing, and refining companies. New officers elected at the twentieth annual conference include: J. F. Collerain, Houston Pipe Line Co., Houston, director and retiring president; D. H. Levy, Magnolia Petroleum Co., Dallas, president; W. H. Massey, Interstate Oil Pipe Line Co., Shreveport, vice president; and R. M. Slough, The Ohio Oil Co., Findlay, Ohio, secretary-treasurer

Oil Industry Needs Steel, Not Controls, Officials Conclude

by Bertram F. Linz

WASHINGTON. — President Truman's industrial-control policy which he repeatedly has sought to foist upon Congress received a body blow last month when a special task committee headed by Walton Seymour, head of the Interior Department's power division, reported that not only will the prospective petroleum supply situation in the next 12 months not warrant the imposition of government controls but any action along that line "might have a disruptive effect that would make matters worse instead of better."

The report was sent to the White House as a confidential document, but has been released to refute reports that Secretary Krug had pressed for action on government control at a recent cabinet meeting.

Seymour's fuel and power task committee said frankly that the oil industry will have to make efforts of the first magnitude to meet next winter's heating-oil demand and will succeed only if all factors are favorable.

"There is no safety factor," it declared. "Even with all developments favorable, supply and demand will continue in precarious balance."

Since it may be expected that there will be at least minor adverse developments, it is believed that while it may be physically possible to meet demands there may be a repetition, on a reduced scale, of the local difficulties experienced last year.

"It is not anticipated, however, that these local difficulties will be of sufficient magnitude to warrant the imposition of government controls over the supply and distribution of petroleum," the report said. "In fact, with supply and demand in such close balance, and with the industry already engaged in extraordinary efforts to supply the small increment necessary to prevent local shortages, the imposition of government controls might have a disruptive effect that would make matters worse instead of better."

The committee pointed out that its forecast is predicated on the supply of "reasonably adequate" amounts of steel to the industry, and disclosed it has been told that enough plate will be allocated to the pipe mills to keep them operating at capacity. Also, it commented, the voluntary allocation plan now being worked out with the steel industry must be carried through since, "if these efforts should fail in material respects, the supply of petroleum products will suffer accordingly."

"Unless such failure is of major magnitude, however," it was emphasized, "it seems unlikely that resulting shortages of petroleum products will be of such extent as to call for the imposition of controls."

With respect to natural gas over the next year, the committee held the situation turns not so much on what the demand will be but on how much can be made available and where. There will be some improvement over last year in both the Appalachian and Midwest areas but there is no prospect that supplies of gas available in all markets served by interstate pipe lines will be sufficient to meet all of the potential demands.

In his letter of transmittal, Seymour summarized the findings of his committee with respect not only to petroleum and gas but to coal, coke and electric power as well.

"In general," he said, "the report shows a very delicate balance between supply and demand for all fuels and for electric power but it indicates that the imposition of government controls will probably not be necessary except in the event of serious production breakdowns. It also demonstrates that the lack of steel (and a shortage of pipe-mill capacity in the case of oil and gas) is the principal barrier to increased fuel production necessary to increase estimated supply by a safe margin over estimated demand."

Navy Gets Large Fund For Alaskan Drilling

WASHINGTON. — Evincing an awareness of the need for quick development of military oil reserves, the House last week provided funds for full-speed continuance of the Navy's exploratory program in Alaska and authorized experimental work in Colorado to determine the extent and quality of the oil shale in the Navy's big reserve there.

The Navy appropriation bill for the coming fiscal year provided $14,600,000 for the Alaskan project and $245,000 for development of the naval reserves of which $144,000 was earmarked for the shale tests.

Explaining the Alaskan work during hearings before a House appropriations subcommittee, Com. W. G. Greenman, director of naval petroleum reserves, placed the total outlay at some $28,000,000. So far, the department has received appropriations of $2,100,000 and $9,600,000, of which all but about $381,000 already has been obligated. Accordingly, the program cannot be continued after next season unless additional funds are made available, since planning must run some 18 months ahead of operations.

Greenman declared there seems to be no question that there is oil in the reserve but, he said, "we do not know how long it is going to take, or how much it is going to cost" to find it.

A. A. Curtice of the Secretary's advisory committee, however, declared that "at the same stage of exploration, this looks better than the prospects did down in southern Chile, where we brought in an oil field for the government of that country." So far, he said, little has been done beyond preliminary work and the drilling of three wells to slightly more than 6,000 ft., of which only one struck oil.

No deep wells have been drilled because of lack of equipment, the subcommittee was told, but a rig capable of drilling 15,000 ft. has been secured and a deep well to some 12,000 ft., over an oil seep, is planned. If this summer's work warrants, another similar rig will be secured.

The $144,000 provided for work in Naval Oil Shale Reserve No. 1 is to be turned over to the Bureau of Mines with a contract to drill seven core holes.

Greenman explained that the Navy is not now planning to produce oil from shale but wants "merely to start an exploratory program which will give a fair estimate of the quality and quantity of the reserves." This, he pointed out, would be in line with the work being done on the readiness program in Elk Hills and the Alaskan exploratory program.

Congressional Expert Will Watch ERP Oil Angles

WASHINGTON. — The joint committee on foreign economic cooperation, Congressional watch-dog over the administration of the European recovery program, will include in its staff an "agent" for petroleum, it was announced last week by Sen. Styles Bridges of New Hampshire, chairman.

The post will be filled by Rudolph A. McGovern, an alumnus of De La Salle Institute of Science and Columbia University School of Mines, who has had experience in the New York regional office of the War Production Board and has served as a consulting engineer and geologist, Bridges said.

_____this week

PIPE LINES—Texas Eastern Transmission Corp. begins installation of compressor stations aggregating 86,400 hp. . . . Delivery capacity of Inch lines to be increased to 508,000,000 cu. ft. daily. . . . Immediate construction of gathering lines is planned. . . . ¶Court upholds FPC approval granting construction certificate to Michigan-Wisconsin Pipe Line Co. for additional natural-gas supply to Detroit area. . . . ¶Sinclair Refining Co. begins movement of products in Houston refinery-Bryan-Waco-Arlington, Tex. line. . . . ¶El Paso Natural Gas Co. plans 125-mile line from Jal, N. M., to gas-distillate producer in Pecos County, West Texas. . . . ¶Magnolia Pipe Line Co. delivers first crude through its new 650-mile, 20-in. line from Corsicana, Tex., to Patoka, Ill. . . .

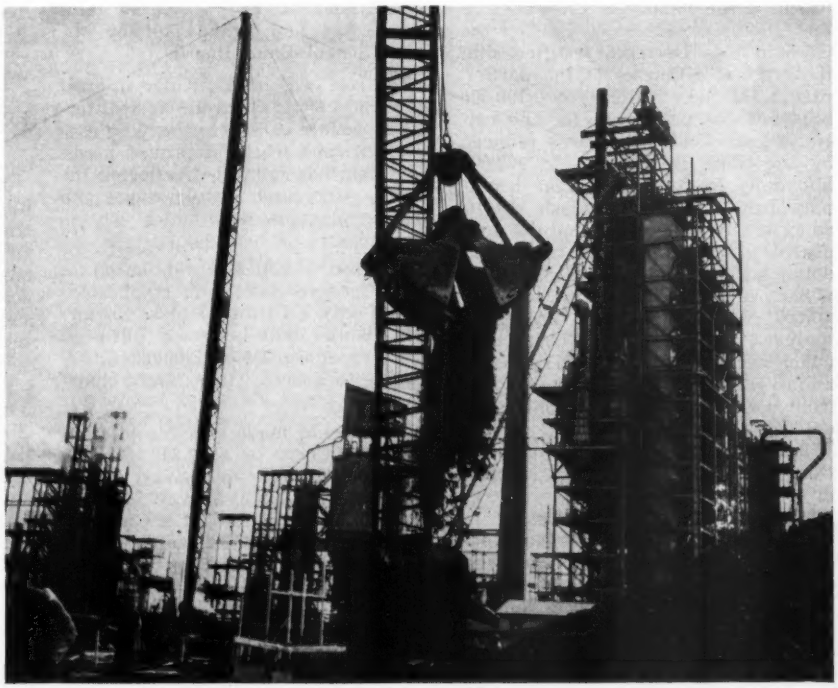
INTERNATIONAL—Latin America has 329 of 478 rotary rigs known to be operating abroad. . . . Total of 215 more rigs on order. . . . ¶Extensive wildcatting program now under way in France and her colonies. . . . ¶Deepest European test drilled to 12,941 ft. . . . ¶Creole Petroleum Corp.'s April production averages 634,695 bbl. daily. . . . Twenty-five development wells brought in. . . . ¶Only one company so far has accepted stiff Philippine concession terms. . . .

MEETINGS—Scouts and Landmen told competition explains why this country has found more oil than others. . . . ¶Society of Automotive Engineers urged to redesign diesel engines to permit more efficient refining practices. . . . ¶Electrical associations hear forecast that electric power and radio will be more widely used in oil industry. . . .

GOVERNMENT—White House told oil industry needs steel, not controls. . . . ¶Oil exports to Europe cut below estimates. . . . ¶Pension plans of major oil companies threatened by government proposal, industry witness testifies. . . . ¶United Nations plans study of world's natural resources. . . .

REFINING—Continental Oil Co. buys Government toluene plant at Ponca City, Okla. . . . ¶Gulf Oil Corp. and Koppers Co. of Pittsburgh combine research efforts in converting coal to gaseous and liquid hydrocarbons. . . . ¶Shell Oil Co., Inc., enlarges modernization plans for its El Dorado, Kans., refinery. . . . ¶Shell Chemical Corp. begins construction of first unit for making oil-derived synthetic detergents at Wood River, Ill. . . . ¶Southern Union Gas Co. of Dallas plans $1,000,000 natural-gasoline plant near Farmington, N. M. . . . Construction to begin this year. . . .

TRENDS—U. S. crude-oil production sets another all-time record high averaging 5,473,645 bbl. daily during week ended June 5. . . . An increase of 33,420 bbl. over the former record high of previous week. . . . ¶Runs to stills also set new all-time record high of 5,715,000 bbl. daily for week ended May 29. . . . ¶In the period March 27-May 29 stocks of the four major products increased 13,721,000 bbl. . . . Last year a drop of 2,988,000 bbl. was recorded for this period. . . . ¶Runs to stills in March 27-May 29 period this year averaged 5,577,000 bbl. daily. . . . A gain of 15.7 per cent over last year. . . . ¶Production of four major products show substantial gains in this period. . . . Gasoline production, 2,403,000 bbl. daily, 15.6 per cent over same period last year. . . . Kerosine production, 329,000 bbl. daily, 10.8 per cent over last year. . . . Distillate production, 1,015,000 bbl. daily, 29.2 per cent over last year. . . . Residuals, 1,306,000 bbl. daily, 11.2 per cent over last year. . . . ¶Indicated demand for these products for same period this year is 10 per cent above last year's demand. . . .



Typical of the tremendous refinery expansion program of the oil industry as revealed by a recent survey of The Oil and Gas Journal (issue of May 20, page 161) is this current scene at the Bayway refinery of Esso Standard Oil Co. at Linden, N. J., as construction starts on a new fluid catalytic cracking unit. This unit will have a capacity of 41,000 bbl. per day, one of the largest ever built. In the background is the present cracking unit, put into service in 1942

Both Dollars and Oil for Europe Cut Below Estimates by House

WASHINGTON.—The House appropriations committee last week cut the European recovery program back by $245,000,000 and decreed that the Economic Cooperation Administration should make the $4,000,000,000 allowed last 15 months instead of 12, as originally contemplated, but the committee's report was couched in such vague terms as to give no indication as to how it felt regarding the oil estimates for 16 European countries and western Germany.

In its report, the committee touched only indirectly on petroleum, expressing dissatisfaction with the proposed large-scale mechanization of farms in the participating countries and pointing out that the shortage of steel and petroleum, plus the general unfamiliarity of the average European farmer with mechanical equipment, "might prove costly and, in the final analysis, unproductive."

Cuts Held Justified

Aside from this, the committee apparently felt that the cut in the appropriation could be offset in part by the smaller export of foodstuffs possible as a result of the larger crops anticipated in Europe, cutbacks in the provision of some other agricultural commodities and coal, and a refusal by ECA to pay inflationary prices based on anticipation of the program.

During the committee's hearings on the bill director Max W. Ball, of the Oil and Gas Division, testified that the original estimates of the participating countries called for 1,190,000 bbl. daily of petroleum for the calendar year 1948, which was reduced by the State Department to 968,000 bbl. daily for the fiscal year beginning July 1. Further analysis resulted in a schedule calling for the supply of 515,000 bbl. daily from non-dollar sources and 434,000 bbl. from dollar sources which, with an estimated 38,000 bbl. of indigenous sources, would total 987,500 bbl., which would allow for refinery losses, minor reexports, etc. Of the supply from dollar sources, 55,000 bbl. daily will be shipped from the United States, a reduction of 36 per cent from the 150,000 bbl. daily shipped in 1947.

The committee was interested in the additional cost of petroleum occasioned by price increases since the original estimates were made, on the basis of July 1, 1947, prices, and it was disclosed by Paul Nitze, special assistant to Economic Cooperation Administrator Paul Hoffman, that there has been a 30-per cent increase over the past year. However, Nitze said, other commodities have risen less sharply and the over-all increase on the entire program is figured at only 7.5 per cent. On the basis of the 1947 prices, petroleum supplies for the 12 months originally scheduled were estimated at $379,700,000.

Little Pipe Included

Petroleum equipment supplies for the 15-month period are estimated at $226,700,000 from Western Hemisphere countries, which includes the requirements of United States companies operating in the participating countries and their dependent territories as well as those of the participating countries themselves, but witnesses before the committee admitted it will be difficult to meet these requirements. Only small amounts of oil-country tubular goods are included in the estimates and no line pipe of large diameter will be required during the first stage of the program. The over-all requirements of American companies and the participating countries will amount to about $685,000,000, but it is believed approximately $458,000,000 can be provided from the production of the participating countries.

Petroleum requirements of the occupied areas, including those for military government administrative purposes, will total 3,031,458 metric tons, or approximately 60,600 bbl. daily, with an estimated cost of $80,467,935, for the fiscal year 1949.

The German requirements will include 650,450 tons, approximately 13,000 bbl. daily, of gasoline to cost $28,092,935; 64,950 tons, or about 1,300 bbl. daily, of kerosine at $1,885,498; and 531,230 tons, or around 10,600 bbl. daily, of diesel oil at $10,975,212. This brings the total cost to $40,953,645.

Japan will require 1,284,720 tons, or approximately 25,600 bbl. daily, of all products, to cost $25,532,535. The Ryukyus will need 40,752 tons, or about 800 bbl. daily, to cost $947,468, while Korea will need 420,120 tons, or about 8,400 bbl. daily, to cost $11,241,918.

Heavy Bids on Texas School Lands Reflect Oil Industry's Expansion

AUSTIN. — Heavy bidding resulting in 557 offers and bonuses of $3,339,416 on 161,314 acres of Texas school land marked a sale of mineral leases here last week by the State School Land Board.

The sale was of particular interest since bids were asked under a different procedure calling for varying royalty on some tracts in proved areas. The high bids submitted reflected the greatly increased exploration and drilling program now under way in the industry.

The board issued a tabulation of the offers received but emphasized it was only a listing of bids. No formal awards will be made until all bids are appraised and checked, according to Bascom Giles, board chairman.

Highest bid made was the offer of Gulf Oil Corp. of $202,240 for 320 acres in Crane County, West Texas, Block 22, Section 2, Survey 28. Next highest was Stanolind Oil & Gas Co.'s bid of $117,200 for 320 acres in Laguna Madre, Nueces County, Southwest Texas, Tract 45. Bidding was heavy for tracts in Corpus Christi Bay, among other areas, and Gulf offered $32,320 for Tracts 47, 48, 54, and 55 in the bay.

Royalty of 58 per cent was the highest of any bid. This offer was made, along with the $3,000 standard bonus, for a tract in Mellon Creek, Refugio County, by Rudco Oil & Gas Co. Next highest percentage royalty was for Tract 1 in the Colorado River bed for which Sun Oil Co. offered a $5,000 bonus and 53 per cent royalty.

New Procedure Used

Acreage offered in the sale included numerous river-bed, bay, and inlet tracts as well as some upland areas. Of the total of the bids, high bids amounted to $1,977,179 for 110,439 acres. Proceeds from the sale and any subsequent royalty go into the public school fund.

The new bidding procedure was set up at the insistence of Price Daniel, Texas attorney general, who with Governor Jester and Giles comprise the School Land Board. It left the fixed rental and royalty of one-eighth applying only to strictly wildcat acreage. For one group of leases within 1 to 2 miles of production, royalty was fixed at one-sixth. For another group of designated tracts in or very close to production, bidding on the state's royalty started at a minimum of one-eighth *(The Oil and Gas Journal, May 6, page 51)*.

No Crisis in Oil Seen by Holman Who Says Supply to Equal Demand

WASHINGTON.—There is no crisis in oil and barring emergencies, such as war, disasters, serious strikes or assumption of an abnormal burden in supplying oil needs abroad, "no one in this country is going to have to make any important change in his way of life because of a lack of oil products," it was declared June 3 by Eugene Holman, president of Standard Oil Co. (N. J.)

Guest speaker at a National Press Club luncheon, Holman briefly outlined the world oil situation and the expected developments of the future and then, under a barrage of questions, told Washington correspondents of the nation's leading papers:

In view of the progress that has been made, demand on the industry this summer and next winter will be no greater than supply. Some filling stations may run out of gasoline at times, but that occurs even when conditions are normal.

The long-range picture shows nothing to cause alarm but foreign reserves must be developed rapidly to keep pace with increases in Eastern Hemisphere requirements.

The Middle East resources are being developed independently of those in the Western Hemisphere and for the primary purpose of supplying the peaceful needs of Europe. "However important it would be to have American-developed and operated sources of oil there in the event of war, I want to emphasize that our developments and interests there are based on peacetime commercial needs," Holman said.

In the event of war, oil needs for our military forces could reach very large figures and the whole question of military oil supplies is under active study, but the industry will meet any needs that may arise.

State ownership of the tidelands is preferable to federal ownership, from a purely operating standpoint, because of the greater red tape involved in dealing with the federal Government and the faster and better action where state governments only are involved.

Standard is anxious to avoid any spiraling of prices which may add to inflationary trends and is hopeful of avoiding any further crude price increase.

All that Mexico needs to develop additional oil is the "effort that goes into it" in the shape of capital and technical knowledge, and if they lack either development will be delayed.

Natural gas is the best bet today for production of synthetic fuels but it will be 10 years before a substantial synthetic supply is developed.

Interior Department Bemoans Cuts Congress Made in Appropriations

WASHINGTON. — Interior Department officials last week dusted off their annual warnings of the dire results of failure by Congress to give them all the funds they asked for and paraded them before a not too sympathetic Senate Appropriations Committee.

Soft pedaling the nearly $113,000,000 more than this year which the House allowed in passing the department's appropriation bill for fiscal 1949, they dwelt sorrowfully upon the $84,000,000 which was cut from their estimates.

Thus, for example, Secretary J. A. Krug told the committee that the refusal of some $4,548,000 asked by the Geological Survey, which the House gave $880,000 more than it has for this year, "can have an adverse effect upon our strategic mineral position in this country."

Interior officials stressed the international situation and the critical condition of our domestic mineral supply and called the cuts "risky" and their restoration a "sound investment in national security."

The committee is expected to recommend some increases for projects which the department can show will be handicapped by lack of adequate funds, but members listening to Interior officials did not seem apprehensive that calamity would be the quick result of the economy program which the Republicans are trying to put through.

Oil Show Asked for 1952

The Petroleum Equipment Suppliers' Association, meeting in Colorado Springs this week, adopted a resolution requesting the executive committee of the International Petroleum Exposition to give favorable consideration to holding the next exposition in 1952.

William B. Way, manager of the exposition, stated that the executive committee would make an extensive survey of 1948 exhibitors and of oil companies before reaching any decision.

The equipment suppliers also asked that the president of their association be made a member of the I.P.E. board of directors.

Krug Calls Industry On Allocation Plan

WASHINGTON.—Interior Secretary J. A. Krug has called a public hearing on the industry's voluntary allocation plan for 10 a.m. June 18 in the Interior Department auditorium.

The plan, drafted by an industry advisory committee set up by Krug, will go into effect upon the date of his approval and terminate February 28, next, at the latest.

In announcing the hearing, Krug called on all members of the industry to comply with the plan, follow any and all recommendations made thereunder, and cooperate with other members of the industry.

"To the extent that a member of the petroleum industry complies with this voluntary plan, with recommendations made under the plan, and cooperates with other members of the industry in carrying on activities under the plan, he will be entitled to the immunities from the antitrust laws of the United States and the Federal Trade Commission act as provided for in Section 2 (c) of Public Law 395, 80th Congress, but such immunities, however, shall not extend to any activities which are not within the intent and purposes of said Public Law 395," Krug stated.

To Install Catalytic Cracking at Drumright

Tide Water Associated Oil Co. has completed plans to install a catalytic cracking unit at its Drumright, Okla., refinery. The refinery, which is one of the oldest in Oklahoma now operating, has a crude-oil capacity of 12,000 bbl. daily with thermal cracking capacity of 5,000 bbl. daily. Details of the improvement program will be announced later.

The refinery is connected with the products pipe-line system of Great Lakes Pipe Line Co. which serves several refineries in Oklahoma and Kansas, with terminals in the Middle West where Tide Water Associated Oil Co. has distribution.

International

WORLD-WIDE OIL DEVELOPMENTS

Latin America Has 329 of 478 Known Rigs Operating Abroad

A TOTAL of 478 rigs, the vast majority of which are rotaries, are currently operating in 45 foreign countries, according to a recent and authoritative survey. This compares with 508 rotaries which were reported to be operating earlier this year. *(The Oil and Gas Journal, February 26, page 92.)* However, Alaska and Canada which previously accounted for a total of 34 rigs, are not included in the current listing.

As information from Russia and Russian-dominated countries continues to be withheld, estimates from those areas have not changed. Russia is believed to be running 500, Austria 10, Poland 5, Czechoslovakia 6, and Germany 18. About nine rigs are operating in Japan.

Reports from various companies operating abroad indicate that there is a prospective increase of 215 rigs compared with earlier reports which showed a prospective increase of 154.

Of the 145 rigs reported to be operating in Venezuela, 75 are in eastern section, 14 in the central, and 56 in the west. Of the 26 probable increase, 9 are in the east, 1 in the central, and 16 in the west.

The two additional rigs shown as a prospective increase in Spain probably will be light rigs. Of the six rigs currently operating in Turkey, five are believed to be light.

In Latin-American countries, 329 rigs are now running compared with 317 reported last February. The prospective increase for additional rigs now approximates 117 in Latin America compared with 75 in February.

Activity in Latin America is indicated by the fact that of the total of 478 rigs running throughout the world, 329 are in Latin-American countries. And of the total prospective increase of 117, the report shows 75 probably will be in Latin America.

The 45 countries where the 478 rigs are operating, the prospective increase, and the total are shown in the accompanying table.

	Rigs running	Prospective increase	Total
Abyssinia	0	1	1
Algeria	2	2	4
Saudi Arabia	11	6	17
Argentina	59	60	119
Australia	1	2	3
Bahrein	2	1	3
Bolivia	2	0	2
Brazil	5	2	7
Burma	2	2	4
Chile	4	1	5
China	3	1	4
Colombia	27	0	27
Cuba	0	2	2
Cyprus	0	3	3
Denmark	2	0	2
Ecuador	13	3	16
Egypt	8	3	11
England	9	4	13
France	18	3	21
French Equatorial Africa	1	1	1
Holland	6	2	8
India	12	5	17
Iraq	6	6	12
Iran	9	6	15
Italy	11	2	13
Kuwait	9	3	12
Madagascar	0	2	2
Morocco	6	0	6
Mexico	29	6	35
N.E.I.	15	25	40
Nigeria	0	1	1
Palestine	0	1	1
Paraguay	2	0	2
Panama	1	0	1
Peru	20	5	25
Philippines	0	1	1
Qatar	2	4	6
Syria and Lebanon	3	3	6
Spain	3	2	5
Trinidad	22	12	34
Trans-Jordan	0	3	3
Turkey	6	3	9
Tunisia	2	0	2
Venezuela	145	26	171
Total	478	215	693

Argentine Price Increase No Benefit to Oil Firms

Although the Argentine Government last week increased the price on gasoline and kerosine by approximately 70 per cent, and although this price will be reflected in private oil company sales—as well as the government-owned Yacimientos Petroliferos Fiscales—the private companies are not expected to benefit.

The reason for this, according to a well-informed source, is that only about one-fifth of the 70 per cent increase is expected to be retained by the private oil companies, the government getting the remainder. Moreover, it is pointed out, as soon as the unions learn of the increase there will probably be another clamor to increase wages.

With the price increase, gasoline in Argentina is now selling at about 60 centavos a liter, or about 58 cents a U.S. gallon. The increase apparently was made more to discourage greater consumption than it was to raise additional funds, all of which reflects the tight petroleum-supply situation there.

Shell to Continue Its Construction, Exploration

An additional £200,000, approximately $800,000, will be invested by Royal Dutch-Shell for its exploratory and drilling operations in Queensland, Australia, according to a radio report on the Australian radio. Shell's investment there is said to approximate £14,000,000 or about $56,000,000.

Czech Discovery Reported

A new oil discovery has been reported by the Czechoslovak Ministry of Industry near Hodonin field in southern Moravia. Hodonin field was discovered in 1919. Czechoslovakia's total crude-oil production amounts to about 500 bbl. daily. No information was given as to the possible extent of the newly announced discovery.

German Crude Output Up

Germany's crude-oil production for April totaled 50,141 tons, or approximately 12,533 bbl. daily, compared with 50,673 tons, or 12,667 bbl. daily for March.

Indigenous crude oil in Germany is centered largely in the British zone of Lower Saxony with some in the U. S. zone. Daily production this year has been slightly above the daily output for 1946 and 1947.

Only One Company Accepts Stiff Philippine Concession Terms

PRIVATE oil companies will be permitted to operate in the Philippines if they agree to certain rather rigid conditions laid down by the Philippine Oil Commission. This commission, which was created to shape national oil policies concerning exploration and development, has now committed itself to a somewhat definite program.

Whether all the foreign oil companies which have been seeking leases in the Philippines will agree to the terms remains to be seen. Only the Philippine Oil Development Co. has so far indicated a willingness to accept the terms, and it seeks one modification.

The terms, as outlined in a Reuters dispatch from Manila, are:

1. Twelve and one-half per cent royalty on all crude oil produced and a similar royalty on natural gas will go to the government.

2. A guaranteed income for the government, ranging from $50,000 to $250,000 yearly on each contract during the period of actual development and payable whether or not oil is discovered.

3. No monopoly is to be allowed and each company which has applied for a concession will be granted not more than 50 per cent of the area applied for. The four principal applicants are: Standard-Vacuum Oil Co., Philippine Oil Development Co., Philippine Gulf and Union Oil companies, a joint undertaking, and Marsman & Co.

4. Companies which sign contracts with the government will pay for use of reports on geological surveys made by the government-owned National Development Co.

5. At least 10 per cent of the net profit of each company is to be paid to the government.

6. The number of geological parties and the amount of equipment for exploratory drilling will be limited. Moreover, all companies will be required to meet certain conditions concerning oil-development and refinery operations.

7. Before granting concessions, the financial resources, organizational experience, and technical "know how" of the applicants will be considered.

Approximately 30 to 50 per cent of 170,000 sq. km. (106,000 sq. miles) of potential oil-bearing lands will be leased, according to the Manila report, which also states that there are at least five regions where there is an overlapping of claims. These regions include Panay, Leyte, Cagayan, Mindanao, and Central Luzon.

As soon as the Philippine Oil Commission makes its decision on overlapping claims, on the basis of the companies' ability to meet the above seven requirements, the program will be submitted to President Quirino for final action.

Philippine Oil Development Co., in expressing its objection to paying for geological reports of the government-owned National Development Co., stated that it would seek exemption to this condition on the grounds that Philippine Oil Development Co. has already incurred $1,000,000 in expenses for exploratory work.

Jersey Group's Crude Output Up 8.6 Per Cent

TOTAL world-wide crude-oil production of Standard Oil Co. (N. J.) and its affiliates totaled 1,236,000 bbl. for the first 4 months of 1948.

In making this statement at last week's stockholders' meeting, Eugene Holman, president, explained that this figure represents an 8.6-per cent increase over production for the corresponding period last year.

Jersey Standard's world-wide refinery runs, for the same 4-month period, reached 1,319,000 bbl. daily, up 6.9 per cent over the first 4 months of 1947.

Crude production from domestic operations, Holman added, constitutes less than half of the company's total oil production and has shown a greater increase so far this year than foreign production.

The company's foreign figures included no production from either Romania or Hungary since operations in both countries are substantially out of the company's control as a result of drastic actions against private enterprise taken by the Russian-dominated governments there.

A late Reuters dispatch from Bucharest states that a Romanian Government company, Petrol Export, has been established to export Romanian crude oil and petroleum products. The company hopes to import spare parts and other types of oil-industry machinery for the local development of crude oil.

In the Netherlands East Indies, the Jersey Standard affiliate, Standard-Vacuum Oil Co., has increased its crude-oil production to 43,000 bbl. daily. This compares with the prewar production of 48,000 bbl. daily, Holman explained.

Speaking about foreign refining operations, Holman said: "Abroad most refineries are running at above their prewar rates without as yet feeling the effect of the major planned expansion. The Fawley refinery in England is operating at 25 per cent above the prewar rate. The Port Jerome refinery in France is running 35 per cent over prewar and making 50 per cent more lube oil than prewar.

"We now plan to build a new refinery at Fawley, increasing our throughput there to some 120,000 bbl. daily. In Italy, we are planning to acquire an interest in an existing refinery and in Germany our plans call for rebuilding our refinery in Hamburg, adding to it and modernizing it as necessary.

"These changes and additions, together with modifications in the Port Jerome refinery, will permit all of these refineries to operate on crude from the Middle East. When this general program is completed we believe that the requirements of our European markets can be supplied largely from European refineries operating on crude from the Middle East."

Creole's April Output Drops to 634,695 Bbl.

Venezuelan crude-oil production of Creole Petroleum Corp. for April was 634,695 bbl. daily, which is only a slight change from the record-high reached in March of 636,063 bbl. daily. Of the April total, 469,359 bbl. were from the Lake Maracaibo area; 160,480 bbl. from Eastern Venezuela; and 4,856 bbl. from Cumarebo.

Creole's refinery runs in April reflected another drop, this time to 38,292 bbl. daily compared with 49,901 bbl. daily in March. Refinery runs in February were at the rate of 70,720 bbl. daily. Of the 38,292-bbl. figure, 17,890 bbl. were refined at Caripito and the remaining 20,402 bbl. at La Salina.

Creole brought in 25 development wells, all oil. No wildcats were reported as having been completed and there were no gas wells. There was only one dry hole, that one in the Quiriquire field. Fields where oil producers were brought in, their average initial production and average depth follow:

Bolivar Coastal (B.C.F.) 13 wells, 694 bbl., 4,365 ft.; Quiriquire 4 wells, 559 bbl., 4,287 ft.; Jusepin 2 wells, 117 bbl., 4,317 ft.; Mulata 2 wells, 357 bbl., 6,160 ft.; San Joaquin 2 wells, 495 bbl., 6,217 ft.; and Temblador 2 wells, 166 bbl., 4,243 ft.

French Oil Industry Has Extensive Wildcatting Program Under Way

by Warren W. Burns

THE French oil industry is making a serious effort to increase its production of indigenous crude, both in metropolitan France and overseas, and to repair war damage to its transportation facilities.

An extensive wildcatting program is under way, though results to date have not been markedly successful. Natural-gas and petroleum-products pipe lines are under construction, and the fleets of tankers, river barges, and tank cars are being enlarged.

Approximately 300 wildcat oil wells will be drilled in France and in French overseas colonies during the next 4 years. Of this number it is expected that at least 50 per cent will be drilled to 9,000 ft. or more.

Around 125 of the tests will be confined to southwest France, 75 in other areas in France, and the remaining 100 overseas. While actual footage may be considerably less than would be drilled by an equal number of rigs in the United States, French production officials point out that this program is principally concerned with geological structures on which there has never been any drilling and that much of the overseas drilling will be in wild and remote areas.

Of the present total of 38 rigs in France and overseas, about 18 are rotaries. Orders have been placed in the United States for an additional 17 rigs which may be delivered and in operation on French wildcatting activities this year. The total number of rigs will gradually be increased to 70 by 1951 in spite of withdrawals of some of the older ones.

Regie Autonome des Petroles, owned 100 per cent by the French Government, recently completed a test in the Puy Maurin area and abandoned it at 12,941 ft. This is believed to be the deepest test ever drilled in Europe.

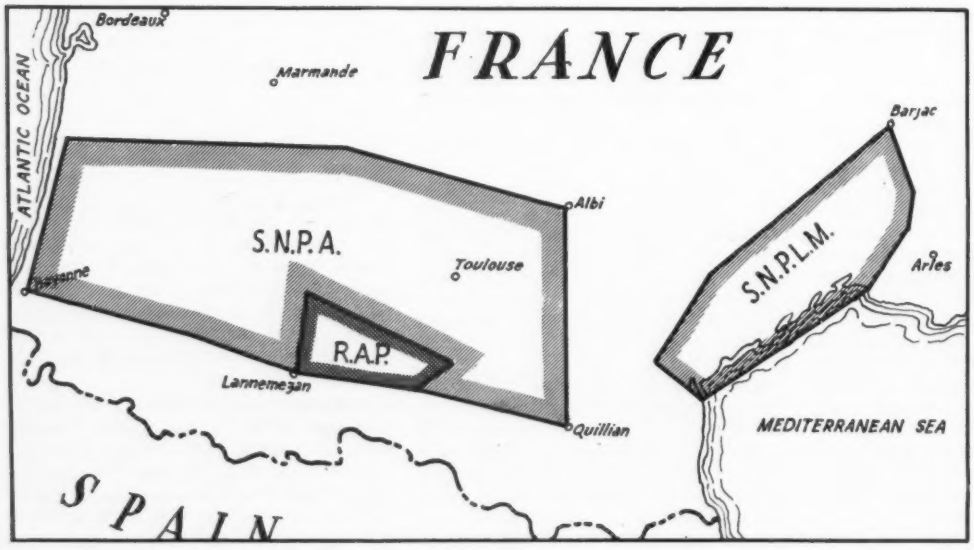
Three Companies Active

Last year a total of only 118,400 ft. was drilled in metropolitan France. An additional 102,400 ft. was drilled in French overseas colonies. In Pechelbronn, the only indigenous crude-oil-producing area in France, with a daily output of around 1,000 bbl., 83,584 ft. of development drilling was completed in 1947. Prewar crude-oil production at Pechelbronn approximated 1,400 bbl. daily and is gradually climbing back to this figure. The output is confined to the old Alsatian wells. During the first 4 months of this year a total of 10,700 meters, or 34,240 ft. was drilled at Pechelbronn.

Wildcat drilling in France is currently and largely being carried on by Regie Autonome des Petroles (R.A.P.), Societe Nationale des Petroles D'Aquitanie (S.N.P.A.), and Societe Nationale des Petroles du Languedoc Mediterranean (S.N.P.L.M.). In addition to having completed the Puy Maurin deep test well, R.A.P. also recently abandoned another well in the Aurignac area at 7,014 ft. R.A.P. wildcats in the Plagne and Castilon areas were down respectively to 1,962 ft. and 1,395 ft. as of May 1, 1948. R.A.P. has six other wildcats drilling. The areas and the depths, as of this past May 1, follow: Saint Marcet (two wells) 5,391 ft. and 6,762 ft.; Proupiary, 7,215 ft.; Plagne, 11,223 ft.; Richou, 7,341 ft.; and Saint Martory, 3,096 ft.

S.N.P.A. abandoned a wildcat, late in April, at 7,794 ft., in the Antin area. Four other S.N.P.A. wildcats are currently being drilled in the following areas, with depths as of May 1 this year: Garlin, 7,986 ft.; Bastennes-Guamjac, 12,150 ft.; Audignon, 6,621 ft., and 8,166 ft. Two additional S.N.P.A. wildcats which were spudded early this year were in Garlin and Audignon with depths, as of May 1, of 2,808 ft. and 2,736 ft., respectively.

S.N.P.L.M. is currently drilling five wildcats, three of which are in the La Vaunage area. Depths of these tests as of May 1 were 8,508 ft., 6,360



Approximately 125 of the 300 projected French wildcats to be drilled this year will be located in southwestern France. Map here shows the areas where the three principal French oil companies are currently operating. (Courtesy, French Embassy Information division)

ft., and 1,503 ft. The other two wildcats are located at Quissac and Castelnau where May 1 depths were 10,950 ft. and 2,658 ft., respectively.

At a depth of approximately 6,000 ft., a successful wildcat has been completed in the Saint Guadens area of the French Pyrenees, according to a Reuters report from Paris. French sources in New York had nothing to add to the report, which stated that the daily potential was about 142 bbl. of crude oil.

Drilling has been carried out in this area since 1939, but aside from methane gas, which was piped to Toulouse, no oil was discovered.

Drilling Overseas

Overseas, French drilling activities were highlighted late last year by the discovery of oil in Morocco at Petit-Jean. *(For map of this area and story see The Oil and Gas Journal, November 22, 1947, page 43.)* The discovery well showed a daily production of approximately 126 bbl. At Petit-Jean, in the Plaine du Rharb area, Societe Cherifienne des Petroles completed a test at 3,603 ft. in April and abandoned it as a dry hole. S.C.P. abandoned another test at about the same time, at 765 ft., at Karia Daouia in the Collines du Rharb area. Upwards of 35 wildcats and observation wells have been drilled in Morocco, with depths varying from 312 to 3,450 ft.

In Algeria, the Societe Nationale de Recherches et d'Exploitation des Petroles en Algerie has abandoned eight wildcats this year. Depths varied from 1,413 to 5,100 ft. Two additional wildcats, one in the Bou Guirat area and the other in the Kherba area, were down, respectively, to 2,181 ft. and 766 ft. as of May 1.

In Tunisia, the Syndicat d'Etudes et de Recherches Petrolieres is currently drilling two wildcats. The one at El Haroune was down to 5,361 ft. on May 1 and the other at Cap Bon had reached 2,610 ft. on the same date.

In Gabon, in French Equitorial Africa, the same company is drilling a wildcat at Mabora which was down to 3,237 ft. on May 1.

The need for France to develop her own crude-oil production is shown by the fact that last year's consumption of petroleum products totaled 5,614,000 tons, or approximately 39,498,000 bbl. Of this total, 1,722,000 tons, or 12,054,000 bbl., were gasoline and 2,289,000 tons or 9,023,000 bbl. were fuel oil. Operating largely on imported crude oil, French refineries last year supplied 4,611,000 tons, or 32,277,000 bbl. A total of 5,030,000 tons, or 35,210,000 bbl., of crude was processed in France during 1947.

Total annual refinery capacity in France as of December 31, 1947, was 7,230,000 tons or 50,610,000 bbl. This is approximately 140,000 bbl. daily. *(For detailed discussion of postwar refining activities in France, see The Oil and Gas Journal, April 22, page 62, and May 6, page 58.)*

Transportation Expanding

As of the first of last January, the French oil industry owned 39 tankers, including those laid up for repair, with a deadweight tonnage of 557,000, compared with 22 tankers of 300,000 dwt. at the beginning of 1947.

Approximately a third of the French tanker fleet is still under repair due to war damage and the need for a normal overhaul. By 1951 it is hoped that the tanker fleet will total 49 ships of 900,000 dwt.

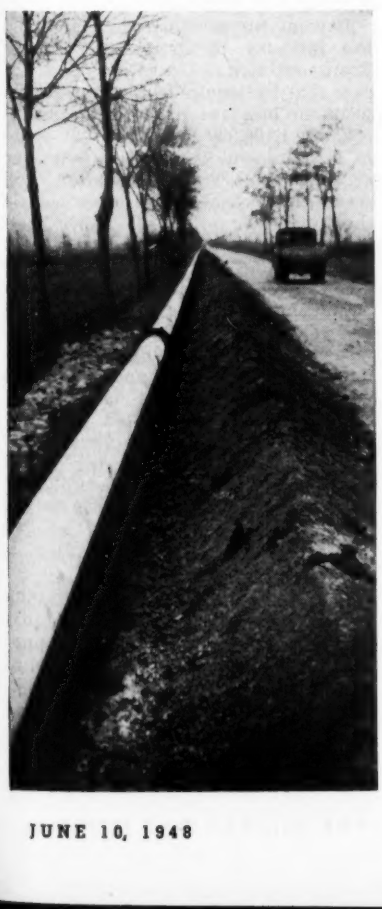
To enlarge the sale of natural gas, Regie Autonome des Petroles is building a 12-in., 100-mile, pipe line from Saint Marcet field to Toulouse. This will parallel a 6-in. line which was completed in 1942. Plans call for the construction of an additional 150 miles of line from Toulouse to Brodeaux. It is hoped to have this line completed some time next year.

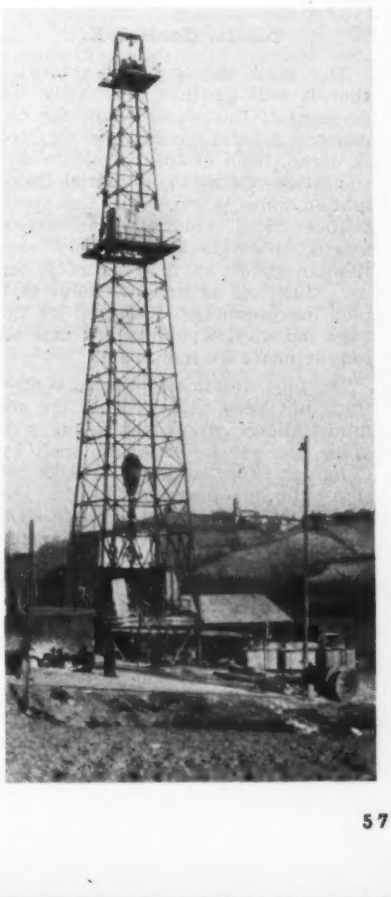
Meanwhile, a 12-in. products line is being built from Le Havre to Paris. This will have a capacity of about 40,000 bbl. daily and should be completed by 1949.

As of this past January there were 373 river barges transporting petroleum and petroleum products throughout France. An additional 114 were under repair. As for the tank-car situation, there were 7,916 operating on January 1. Plans call for 1,800 more being in service before the end of this year. These tank cars have an approximate capacity of 135 bbl. which is somewhat smaller than tank cars in the United States.

France imported approximately 610,000 tons, or 152,000 bbl. daily of crude oil during April compared with 627,000 tons, 157,000 bbl. daily, in March, according to official government figures released in Paris.

France also imported 88,000 tons of fuel oil, 21,750 bbl. daily, compared with 93,000 tons, 23,250 bbl. daily, in March. April imports of gasoline climbed to 33,600 tons, 8,250 bbl. daily, compared with March imports of 25,000 tons, 6,225 bbl. daily. A total of 8,250 tons, 2,000 bbl. daily, of lubricating oil were imported against March imports of 6,000 tons, 1,500 bbl. daily. April gas-oil imports increased to 14,200 tons, 3,500 bbl. daily, compared with 10,000 tons, 2,500 bbl. daily, in March.





Left: Portion of the 12½-in. gas pipe line which extends from Boussens to Toulouse

Right: Site at Puy Maurin of the deepest wildcat ever drilled in Europe. R.A.P. drilled to 12,941 ft. before abandoning the well

WASHINGTON WATCHING

BY BERTRAM F. LINZ

Talk Beats Controls

WASHINGTON.—Government officials concerned with oil believe that discussion of the proposed allocations of steel for the industry have in themselves accomplished about as much as will be attained under the allocation agreement itself.

The figures and arguments presented, both in the National Petroleum Council committee report and in testimony before the House interstate commerce committee and the Senate small business subcommittee, have focused attention upon the problem and brought the steel industry to a full realization of its responsibilities.

A very practical accomplishment, it is pointed out, has been the securing from the steel industry of a promise that its pipe mills will be kept operating at capacity from now on. While this will not mean that the estimated requirements of the oil and natural-gas industries will be met in full, it is believed that the increased production will give the oil industry about as much pipe as it can handle currently, particularly if the expanded military program results in a tightening of the labor market as is expected.

Tubular Goods O. K.

The steel industry has estimated that it will produce practically 100 per cent of the requirements for oil-country tubular goods, and Clifford A. Hahn, head of the petroleum section of the Office of Industrial Cooperation, now is exploring the possibilities of a voluntary agreement among operators to take only such tubular goods as they actually can use. Such an agreement, Hahn said, plus the production promised by the steel industry, would insure that all requirements are met in full.

The pipe situation, however, is anything but clear, at best, since the administration's ship-construction program has yet to be acted upon by Congress. The proposed $100,000,000 ship-building program would cut deeply into the supply of plate steel and if pushed full speed might make it impossible for the steel producers to carry out their promise to operate the pipe mills at capacity.

Also far from certain is the outlook for steel for the marketing branch of the industry, which will be taken under consideration after what are considered the more pressing problems of the production and transportation sections are disposed of.

Europe's Oil Prorated

THE petroleum phase of the European Recovery Program is proving to be a major problem to the Economic Cooperation Commission, as yet without an experienced oil man to deal with the question.

Operating currently on a month-to-month basis, ECA is finding that oil can't be handled as simply as, say, flour, and experienced observers in Washington foresee that of necessity the requirements of the Marshal-plan countries will have to be put on a quarterly basis.

Equally important, ECA will have to know continuously how much oil the European countries are receiving from nondollar as well as dollar sources, which may not sit too well with some countries that have access to nondollar oil.

When the Foreign Assistance Act went into effect in April, the participating countries submitted 1-month requirements programs. When ECA said it would have to have a more complete picture, they came through with 2 and 3-month programs, but in the case of oil it quickly became apparent that requirements would have to be set up on a quarterly basis if they were to be dealt with intelligently.

The course which ECA now is seen as probably adopting will call for the submission of quarterly estimates from each country for 1 years in advance. Following analysis, the program for the first quarter will be approved as submitted or changed in Washington, and will become a firm commitment. By the approach of the following quarter, each country will be asked to submit any changes which it may find necessary in its original estimates, together with an estimated program for the third succeeding quarter. In other words, the estimates at all times would cover a period of 4 quarters.

Countries Must Report

In submitting these programs, the Marshall-plan countries will be asked to report what nondollar oil they anticipate getting, and that will be taken into consideration in deciding what they are to get from dollar sources.

This requirement will be based on the fact that oil is oil wherever it may be, there is just so much, and what there is must be made to serve all the democratic nations. ECA will not stand for the participating countries getting their requirements of oil under the recovery program at the expense of the United States and then supplementing that supply by purchases from nondollar sources.

One of the big jobs of administering the recovery program will be that of policing to see that such situations as that outlined above do not develop. Here, too, ECA is believed to have an answer, in the shape of a form on which it will require the participating countries to report how their requirements programs have been fulfilled. That report would call for information on all oil imported by the participating country, dollar and nondollar.

All this implies that ECA officials are going to be tough, if necessity arises, but if they have to get tough they will be supported by the congressional "watchdog" committee which is committed to seeing that ERP funds are not wasted or misapplied.

Get Your Own Market

THE Federal Power Commission has given the coal industry a hint that if it fears it will lose customers as a result of the building of new natural-gas pipe lines it should go out and develop new markets.

It went further than that, and told the industry in its opinion in the Transcontinental Gas Pipe Line Co. case that Philadelphia Electric Co. expects to increase its consumption of coal by 1,100,000 tons per year within 5 years and other utilities in the area which Transcontinental will serve also expect to use more coal in the future.

"The record thus shows that, with an expanding market for fuel-generated power in the region, the economic impact of the relatively small and decreasing displacement of coal resulting from the project upon the interests of the coal and associated intervenors should not be serious," the commission commented.

More important, in the view of the commissioners, is the saving of oil which the gas line will permit—not less than approximately 629,000,000 gal. annually—which, they pointed out, will aid materially in alleviating the oil shortage.

In the same opinion, the FPC told Texas Eastern Transmission Corp. that its purchase of the Big Inch lines didn't give it a monopoly in the Middle Atlantic Seaboard area. The company had complained the Transcontinental project would have a disruptive effect on the orderly and economic development of its own sys-

tem, but the commission intimated it should go in and fight for business.

Oil in World War III

THE next war will be practically a repeat performance of the last one and will bear a striking resemblance to the one before that, in the opinion of America's foremost military experts.

We have the atom bomb and a pushbutton, but so far haven't been able to tie them together for an armchair war.

This is made clear by the Munitions Board in a call to industry to make its plans now for the next war. And in making those plans, board chairman Thomas J. Hargrave said, each plant should prepare to make approximately the same type that it produced during World War II.

For the oil industry, this would mean that most of its output would be pretty much the same as it was when the war ended, with some of it modified to meet the requirements of improved jet planes and possibly some of the secret weapons to which the military are devoting much effort.

Hargrave said "plan now," not because war is expected in the near future but because the next conflict is bound to start with another Pearl Harbor, possibly directed at our important industrial centers, and if industry is prepared it can save 3 to 6 months of time when time may be a vital factor.

For the plant management which thinks it can drift into war production as it did in 1942, Hargrave had a word of warning. The plant without the ability to get into war work overnight will be the plant without protection, he said, for "unless you can shift to essential production, your supplies of raw materials might be cut off and your labor force drained away. The very existence of your company might hang on your preparedness for the emergency."

The Munitions Board urged that each plant appoint a mobilization director to plan quick conversion to military production at its peak rate during the last war.

The how and why of planning are outlined in a 46-page booklet which the board has issued, and regional procurement-planning officials stand ready to cooperate with industry in carrying out a preparedness program.

All of the controls over manpower, materials, prices, wages, and distribution will be invoked immediately in the event of war, the board said, because:

It is logical to assume it would be a major war, long and costly, demanding a total national effort.

Manpower will be essential.

War would probably find our economic structure about the same as at present. That means there would be few idle plants and few unemployed workers, and shortages of manpower and plant capacity probably would be incurred immediately.

There would be immediate shortages of many basic raw materials, specifically oil, steel, copper, aluminum, and rubber, and transportation and power systems would be taxed to the limit.

Because of these factors, industrial mobilizaiton planning is a top-priority matter. "After the atom bombs start falling is no time to start planning," it was declared. "We must do it now."

Expediters Excluded

BUSINESSMEN visiting the Office of International Trade to discuss export licenses find themselves in an atmosphere reminiscent of wartime days.

Where they used to wander up and down corridors looking for the people they wanted to see, they now report themselves at a desk in the lobby, state the purpose of their visit, and are either directed to the proper official or their previously arranged appointments are confirmed.

There are no military guards at the door, badges are not required and personal escorts are not provided, as during the war, but seeing an OIT official is no longer a catch-as-catch-can proposition.

The system was put in ostensibly to save time for businessman visitors and to lighten the load of officials who otherwise might be compelled to neglect their work while answering questions which could be readily handled elsewhere.

The actual reason, however, was a flood of so-called "expediters" whose efforts to pressure OIT to grant licenses to their clients became a nuisance. This is a relatively new profession in which lush fees can be collected for speeding up the issuance of export licenses, contracts, and other papers.

Exclusive Marketing Ruled Illegal by Court

If higher courts uphold the decision of the U. S. District Court in Los Angeles, which ruled this week that Standard Oil Co. of California's exclusive marketing contracts with some 7,000 independent West Coast service stations is illegal, a reorganization of the oil industry's entire marketing practices may follow.

This is the opinion of William C. Dixon, West Coast chief of the antitrust division, who added that the decision also may affect marketing practices in other industries.

U. S. District Judge Leon R. Yankwich held that California Standard's exclusive marketing contracts were in restraint of trade under the Sherman and Clayton antitrust acts. Attorneys for the U. S. Department of Justice agreed with Dixon in that the decision might force revamping of the nation's entire distribution setup.

Anticipating that California Standard probably would appeal the decision—and ultimately take it to the U. S. Supreme Court—Yankwich provided that his restraining injunction shall not go into effect until 6 months after final appeal in the matter. The judge explained that he made this provision in order that orderly marketing procedures would not be disrupted until the case is finally settled.

The stations operated by Standard Stations, Inc., a wholly owned subsidiary of California Standard, are not affected by this decision.

Penn Grade Association Plans June 17 Meeting

Progress in production and refining research will be a featured topic at the twenty-fifth anniversary meeting of the Pennsylvania Grade Crude Oil Association, to be held June 17 at Hotel William Penn, Pittsburgh.

Dr. Richard V. Hughes will present a paper on "Progress in Secondary-Recovery Research." A talk on "Synthetic Liquid Fuels" will be presented by R. A. Cattell and J. D. Doherty, both of U. S. Bureau of Mines.

Capt. Ralph E. Wilson of the Armed Services Petroleum Board will present a paper on "Lubricants for the Military Services." The meeting will close with a talk by Edgar A. Jett, II, on "Research in Peace and War." Jett is assistant director of Armour Research Foundation of Illinois Institute of Technology.

Three Technical Talks Slated for Kentucky Meet

Three technical addresses of interest to oil producers will be presented June 17-18 at the annual midyear meeting of the Kentucky Oil and Gas Association, Lexington, Ky. Hotel Lafayette will be association headquarters.

The technical addresses and authors are: "Ground Water Studies in Kentucky," by Dr. Dan K. Hamilton of University of Kentucky's geological department; "Apparent Problems Facing Water Flooding Operations in Kentucky," by H. S. Barger, engineer for Sohio Petroleum Co.; and "Observation of the Economics of the Waning Gas Reserves in the Appalachian Area," by O. W. Van Petten of Columbian Fuel Co.

J. Howard Marshall, president of Ashland Oil & Refining Co., will preside. Merle Becker, president, and Harold B. Fell, executive vice president, of Independent Petroleum Association of America, will address the meeting.

Fuel Production Can Be Increased By Engine Redesign, S. A. E. Told

THE necessity for reducing refinery yields of motor fuels by reducing end points to maintain octane ratings has been eliminated by the introduction of catalytic cracking and polyforming processes, J. E. Taylor, of Gulf Research & Development Co., and H. J. Gibson, of Ethyl Corp., told the Society of Automotive Engineers meeting at French Lick, Ind., June 6-11.

Practically all world crude oils are suitable for the production of good diesel fuels, said J. R. MacGregor, G. R. McPherson, and P. L. Pinotti of California Research Corp., in discussing the future of diesel power and its fuel requirements.

American railroads will be largely dieselized by 1955, President J. W. Barriger, of the Chicago, Indianapolis & Louisville Railway, told the automotive technical executives and engineers, in outlining the probable prospects and future of the rail industry.

These are the main highlights of the automotive and allied industries as indicated by statements of leaders in these lines, speaking before capacity audiences of this automotive technical organization.

Prewar Trends Reversed

Prewar trends in volatility of motor fuels have been reversed by the introduction of new refining processes, the adoption of which has been hastened by the war, Taylor and Gibson said. Straight-run and thermally cracked fuels were the main prewar blending constituents, and an increase in either volatility or octane rating was obtained by cutting back the end-point temperatures, especially that of thermally cracked components, the authors explained. Catalytically cracked and polyform (gas reversion) gasolines are different in that octane rating is fairly constant as the end points are raised.

Premium fuels may be maintained at high volatilities by using the high-end-point cracked material in regular-grade fuels, which results in very low volatility for the latter, Taylor stated. If necessary to market volatile fuels in both grades the yield of motor fuel for a theoretical 50,000-bbl.-per-day refinery will be cut 3,000 bbl. per day or 9 per cent of total production. These figures apply to a plant having straight-run gasoline; catalytically cracked gasoline by recycling operation; polyforming of low-octane-number straight-run gasoline, and of the 430°-650° F. fraction from catalytic cracking. The loss in yield mentioned is traceable to reduction of the 90° F. end point from 365° to 300° F.

Diesel Specifications Reviewed

It behooves diesel-engine manufacturers to review again the present trend in the demand and consumption of gas oils, from which fractions diesel fuels are drawn, MacGregor, MacPherson, and Pinotti said. These trends indicate that if present quality levels for diesel fuels are to be maintained, additional refining operations will be required, introducing added costs which must be borne by the ultimate consumer. It is therefore to the interests of everyone concerned to utilize every possible means to permit satisfactory use of lower-quality fuels in future.

The authors explained that the prewar practice of diesel-engine makers was to dictate very restrictive specifications which forced many refiners to make a special product with correspondingly high price. Rapidly increasing demands for the middle-distillate fraction of all crudes result in a situation in which more cracked or recycle stocks will be used in making up diesel fuels and with resultant degradation in cetane rating and other important properties in the future. Special refining operations which improve various properties include solvent dewaxing, sulfuric acid treating, selective solvent extraction, and other treating to reduce sulfur content.

In comparative test treatments to determine yields and qualities, 116 gal. of raw diesel-fuel stock was treated with 3.1 lb. of 97 per cent sulfuric acid to yield 100 gal. of finished fuel of 5-cetane-number higher rating than the raw oil, the authors explained. Using extractive solvent, liquid sulfur dioxide, 120 gal. were processed to yield 100 gal. of finished product of the same cetane number improvement. Eighty gallons are extracted to yield 60 gal. of 50.2-cetane-number fuel which is then blended with 40 gal. of the same raw stock to give the same 5-cetane-number upgrading as obtained with acid.

In the solvent extraction case very little stock was destroyed while the acid treating destroyed practically all of the 16 gal. lost from the finished fuel. The estimated costs of these operations are 5.1 cent per gallon for acid treating, or 1 cent per cetane number improvement; and 1.2 cents per gallon for solvent extraction, a heavy advantage in favor of solvent extraction. Sulfur content is reduced strongly by each treatment with the best results from acid. However, in each case its value was reduced to less than 0.1 per cent.

Diesel locomotives aid especially in improving the two main objectives for railroad efficiency increase, those of pulling heavier trains faster, according to Barriger, C. I. & L. president. In the United States at present we have 100 million steam locomotive horsepower, 7 million diesel-electric horsepower and 3 million electric horsepower in locomotives. By 1955, Barriger predicted, we shall have at least 30 million locomotive diesel horsepower on our railways and probably much more, and these will be doing 75 per cent of the railway's work. Steam locomotives transmit 1,000 hp. or more per axle; diesel units transmit not more than 400 hp. which underlies their great starting torque. The greatest advantage for diesels is their low operating and upkeep costs.

New York Picked for Next Compact Meeting

DALLAS. — Many existing secondary recovery and pressure-maintenance projects would not be successful in the absence of some form of pooling or unitization of property interests.

This statement was made here June 4 by Paul D. Torrey, chairman of the Interstate Oil Compact Commission's secondard-recovery advisory committee, when he reported to the executive committee at its monthly meeting.

While authority to permit or regulate secondary-recovery operations already exists in most of the oil-producing states, Torrey said, it is probable in some instances that clarification or amplification of laws might be desirable. The compact is urging statutory review by each state to insure that there are no legal obstacles to inauguration of the most scientifically advanced recovery methods.

The committee voted to hold the annual summer meeting of the Compact Commission at the Roosevelt Hotel in New York City, August 30-September 1. The program committee for the meeting will include executive committee members and Harold C. Ostertag, New York representative.

The executive committee authorized publication, late this summer, of the "Survey of Unitization and Cooperative Projects," now being completed by the research and coordinating committee. Those present at the executive meeting were: Beauford Jester, governor of Texas and compact chairman; Don T. Andrus, Bradford, Pa.; Jeff A. Robertson, Topeka, Kans.; Rex Belisle, Oklahoma City; and Clarence T. Smith, Flora, Ill.

UN Plans Conference to Study Development of Oil Reserves

WASHINGTON. — The economical development of the world's liquid-fuel resources, both presently known and to be discovered and including synthetics, will be one of the major subjects of the proposed United Nations scientific conference on the conservation and utilization of resources, it is disclosed by a provisional program just prepared by the UN Department of Economic Affairs.

Copies of the program have been distributed among the members of an advisory committee on American participation appointed this month by Interior Secretary J. A. Krug, with a request that their comments and suggestions be submitted next month. The membership of the committee includes E. L. DeGolyer, senior partner of DeGolyer & MacNaughton, Dallas, and Paul D. Foote, of the Gulf Research & Development Co., Pittsburgh.

The conference is scheduled to be held from May 16 to June 3, next year, and is designed to develop the latest techniques in the conservation of oil and natural gas, the word "conservation" as used in this connection being defined "the wise use of resources to achieve sustained or stable production with a minimum of waste."

To Be Scientific

It also is being emphasized that the conference is to be scientific rather than policy-making, and no attempt will be made to reach international agreements on policies or to make any recommendations to any government.

In the field of liquid fuels, the provisional program calls for discussions of the techniques of discovery and production. The former will include the need and possibilities of new techniques and the increased costs of finding oil; the progress of surface and subsurface techniques, including the latest developments in the use of the airborne magnetometer and in geochemical and biological exploration; and the economics and potentialities of underwater exploration.

The discussions of production will cover maximum efficient rates of recovery; application of engineering controls to prevent waste and increase recovery, special production problems in condensate fields; modern methods, instruments, and equipment for oil and gas production, including well-perforation, composition and use of mud, cementing techniques, casing programs and deep-well drilling.

One session of the fuels group probably will be devoted to secondary-recovery methods and research, and the problems, economics, equipment, and techniques of receiving oil left underground in the primary phase of operation.

It is proposed also to review fully the progress in synthetic-fuel production from coal, oil shale, gas, and vegetable products from the angle both of development so far and of future possibilities.

The final subject will be utilization. This will cover the economics of competitive fuels for various purposes and their use to meet future fuel requirements; conservation in utilization, including trends in uses of hydrocarbons and increased use of middle distillates for heating and combustion; and byproducts, including developments in the use of oil and coal for other than fuel purposes; chemicals and synthetics, and possible future requirements.

New Techniques Sought

Major objective of the conference is to interest government and management in the practical application of the results of scientific research and the adoption generally of improved techniques developed in any of the participating nations, it is indicated in the program.

"Beginning with a statement of the world's legacy of the depletion and misuse of resources," it is explained, "the plenary meetings will examine the contribution of improved techniques to the alleviation of shortages of mineral resources, fuel and energy, and food and forest products. Attention will be directed to the basic techniques for the measurement of resources, for their protection against waste, and for increasing production by means of improved resource use. A series of meetings will be devoted to the resource techniques of particular importance to the less developed countries.

"Technical developments will be selected for discussion on the basis of the importance of their actual or potential contribution to economic development and to the effective supply of resources, rather than their scientific and technical originality. Such developments are to be described sufficiently to define them from a scientific and technical standpoint and documented adequately to provide guide posts for those interested in further technical study. But once so defined, such techniques are to be treated so as to interest the economist as well as the natural scientist, the resource administrator as well as the engineer. The objective of these section meetings is to highly particularly techniques which could have practical application to the job of extending the supply of resources, either by conservation or by rendering usable previously economically unusable resources."

Canadian Association Elects New Officers

NIAGARA FALLS, Ont.—The Natural Gas and Petroleum Association of Canada, at its annual convention held at the General Brock Hotel on May 27 and 28, unanimously elected the following officers:

President, C. N. Glenny, Provincial Natural Gas Co., Fort Erie North, Ont.; first vice president, S. B. Severson, Dominion Natural Gas Co., Buffalo; second vice president, J. B. McNary, Hamilton; treasurer, George H. Smith, Port Colborne; secretary, Joseph McKee, United Gas & Fuel Co., Hamilton; directors: Frank D. Howell, Brantford; J. B. McNary, Hamilton; J. A. McNevin, K.C., Chatham; Thomas Weir, Union Gas Co., Chatham; and George D. Wickett, Windsor, Ont.

C. M. Sieger of the United Gas & Fuel Co., Hamilton, spoke on recent developments in oil-gas supplementary plants, and on the problems of mixing supplementary products with natural gas. Recent developments in the search for oil and gas in southwestern Ontario were reviewed by W. A. Roliff of the production department of Imperial Oil Co., who detailed results of drilling since 1944.

At an open forum conducted by Vice President S. B. Severson, practical problems of the industry were discussed. Gordon Russell, Union Gas Co., Chatham, and Gary Skeels, Dominion Natural Gas Co., Buffalo, dealt with the prevention of exterior corrosion of gas lines. Operational difficulties in the use of supplementary gases were discussed by K. J. Burnett, United Gas & Fuel Co., Hamilton; Charles Schieffele, Republic Light, Heat & Power Co., Tonawanda, N. Y.; L. W. Near, Windsor Gas Co.; and F. D. Howell, Dominion Natural Gas Co., Brantford. Methods of maintaining production of gas wells in low-pressure areas were dealt with by L. B. Mehlenbacher, Cayuga, Ont., and Carl Lutz, Dominion Natural Gas Co., Dunnville, Ont.

The next convention will be held at London, Ont., on May 26 and 27, 1949.

Oil's Pension Plans Threatened Says California Standard Head

WASHINGTON.—Pension programs of 28 of the largest oil companies in the country will be jeopardized unless Congress enacts legislation overruling a National Labor Relations Board decision that employers must bargain collectively on their retirement plans, a joint congressional committee on labor-management relations was told June 2 by T. S. Petersen, president of Standard Oil Co. of California.

Petersen testified that management always has believed the original National Labor Relations Act was never intended to cover pensions among the points on which bargaining was required, and until the question was brought up in the Inland Steel case it was never pressed by labor.

The board's decision in that case may open the way for excessive pension demands exceeding in cost anything involved in the portal-to-portal suits which followed the Supreme Court's decision in the Mt. Clemens case, he said. There it was necessary for Congress last year to enact legislation outlawing such suits.

Petersen explained that his company deals with 12 separate unions and it would be practically impossible to reach an agreement which would be satisfactory to all of them. Even without negotiations with labor, the development of a practical pension plan is an intricate job involving actuarial tests, acceptance by an insurance company, and approval by the Treasury Department.

"Industry has tried to relate pensions to employe earnings and length of service as the most equitable means of arriving at pension payments," he said. "Suppose that, encouraged by the Inland Steel case, the unions come in to demand flat amounts unrelated to earnings or length of service, which is not improbable.

"That could mean the beginning of the end of several thousand pension plans already set up on sound actuarial grounds and the substitution of a type of plan highly experimental, and very probably beyond the financial capacity of most employers to support. It could well mean that hundreds of thousands of employes of industry would lose the old-age security they now have and count on enjoying. The ultimate end might well be pressure to shift to the shoulders of the Government the burden which industry up to now has voluntarily assumed."

Petersen said that 28 of the 30 largest oil companies have formal pension plans, under 23 of which the employes make contributions. During the past 10 years, he said, his company alone has paid out some $54,000,000 under its plan.

Federal Gasoline Taxes Running Above Last Year

WASHINGTON.—Federal gasoline-collections for the first 10 months of the current fiscal year ran $29,000,000 ahead of the preceding year, and receipts from pipe-line transportation increased nearly $1,400,000, but revenue from the lubricating-oil tax fell $4,600,000, it was reported May 30 by the Bureau of Internal Revenue.

Between July 1 and April 30, last, the bureau disclosed, it collected $389,560,199 from gasoline against $360,316,143 in the same period a year ago; $14,924,700 from pipe-line transportation against $13,527,004, and $62,397,934 from lubricating oil against $67,013,733.

April collections, the report showed, included $29,411,365 from gasoline against $33,957,566 in the same month last year, $5,083,897 from lubricating oil against $5,917,015, and $1,670,651 from pipe-line transportation against $1,371,552.

FCC Studying Radio Use For Gulf Exploration Work

WASHINGTON. — The Federal Communications Commission will hold hearings this month on the use of radio for geological exploration for oil in the Gulf of Mexico.

The hearing was ordered following the receipt of applications from Seismograph Service Corp. and Frost Geophysical Corp. for authority to construct experimental stations. Although a number of oil companies have filed applications for such stations, these were the first requests to come in from service organizations.

Commission officials said the applications apparently contemplate the ultimate establishment of a radio-location service to operate in the Gulf of Mexico and other offshore areas, the operation of which might interfere with other services.

The hearing will go into the nature, extent, and purpose of the operations proposed by the two applicants, with particular reference to the need for the service and the adequacy of existing radio-location service and the feasibility of its expansion.

The committee also will determine what frequencies may be available for the proposed service and the extent to which they would also be available to other applicants proposing the same type of service in the same area.

Texas and New Mexico Join In Rhodes Field Rules

AUSTIN. — Tentative agreement has been reached by regulatory agencies of Texas and New Mexico for rules governing the 11,000-acre Rhodes field which extends into both states.

At a recent meeting in Santa Fe, N. M., questions of well spacing, allowables, and other matters were taken under advisement by both state agencies. In the meantime, the Texas portion of the field is expected to continue operating under a special Railroad Commission order conforming to New Mexico regulations.

Texas and Louisiana have in the past worked out agreements for common fields. The Rhodes arrangement is the first between Texas and New Mexico.

Rhodes field, discovered in 1947, is in Winkler County, Texas, and Lea County, New Mexico. Texas has a statewide rule for 20-acre spacing and 100-bbl. allowable, while New Mexico has 40-acre spacing and a 44-bbl. daily allowable.

FPC Nominee Rejected By Senate Subcommittee

WASHINGTON. — Prospects of bringing the Federal Power Commission to its full strength this year dimmed last week when a Senate interstate commerce subcommittee voted two to one to report adversely the nomination of Thomas B. Buchanan as the fifth commissoner.

The vote, strictly on party lines, followed a series of hearings on the nomination in which strong opposition to Buchanan was voiced by Pennsylvania witnesses who charged that, during his service on the state utility commission, he had proved himself unfit for the post to which President Truman appointed him.

The action of the subcommittee is in line with the policy of the congressional high Republican command of putting aside all nominations to policy-making posts, in anticipation of a turnover in the administration next year, but even if Buchanan's nomination were to reach the floor it could be approved only after an extended fight. Practically all chance of getting the nomination to the floor failed however, when the full committee put off indefinitely a final vote.

PERSONALS

J. S. Freeman Is Named Vice President of Skelly

J. S. FREEMAN, for several years general superintendent of production for Skelly Oil Co., Tulsa, has been elected vice president of the company in charge of production. He succeeds H. M. Stalcup, who has retired.

A lifetime spent in oil production preceded Freeman's elevation. Born in Southwest City, Mo., and educated in the public schools of Bartlesville, Okla., he went to work for Barnsdall Oil Co. in Bartlesville in 1916 in a capacity he describes as "office boy and general flunky." During the Ranger boom in Texas in 1918 he worked as a roustabout and in other jobs in that field for Phillips Petroleum Co., interrupted by 6 months in the Army near the end of World War I.

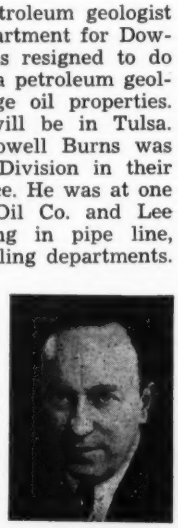
When the Burbank pool was opened in 1920 Freeman was sent there to develop property jointly owned by Phillips and Skelly, and in 1922 he was employed by the Skelly company and moved to its production department in Tulsa. Since then he has worked his way up through that department, becoming assistant to the vice president in charge of production in 1925, and general superintendent of production several years ago.

A. A. Hunt, formerly West Texas district superintendent for Skelly Oil Co., has been named general superintendent of the production department, with headquarters in Tulsa. Other changes in the production department of Skelly include: **H. J. Gibbons** to chief petroleum engineer, with headquarters in Tulsa; **A. F. Holland** and **W. P. Whitmore,** petroleum engineers, New Mexico and Velma districts, respectively, to be associated with Gibbons at the Tulsa office; **P. E. Nunley,** formerly district foreman for the Penwell district in West Texas, to district superintendent for West Texas, with headquarters at Monahans; **G. L. Barrett,** formerly production engineer at Monahans, Tex., to succeed Nunley at Penwell; and **J. H. McCulloch** to chief clerk of the production department, with headquarters at Tulsa.

Ed Taegel, formerly chief geologist for Chicago Corp.'s oil and gas division in Corpus Christi, is now associated with **W. E. Bakke** as a consulting geologist in San Antonio.

W. B. Allen, formerly geologist for Woodley Petroleum Co., has been named in charge of Honolulu Oil Corp.'s new division office at Jackson, Miss.

Ken R. Burns, petroleum geologist in the research department for Dowell Incorporated, has resigned to do consulting work as a petroleum geologist and to manage oil properties. His headquarters will be in Tulsa. Prior to joining Dowell Burns was with Baroid Sales Division in their Well Logging Service. He was at one time with Skelly Oil Co. and Lee Drilling Co., serving in pipe line, production, and drilling departments.



T. E. SUNDERLAND

Thomas E. Sunderland, general counsel, Pan American Petroleum & Transport Co. and a member of the board of directors and executive committee of that company, has been named general counsel of the parent company, Standard Oil Co. (Ind.) Sunderland succeeds the late Buell F. Jones. After serving as colonel in the U. S. Army Air Forces, Sunderland rejoined Pan American after the war. He has previously been associated with several important New York law firms before joining Pan American in 1940. **A. L. Green,** senior general attorney for Standard Oil Co. (Ind), has been named associate general counsel. He joined the company's law department in 1920 and is a specialist in the law of trade marks.

C. E. Allen, formerly with the El Segundo refinery of Standard Oil Co. of California, has been elected president and director of California Refining Co., Perth Amboy, N. J., a subsidiary of Standard. He succeeds **Fred Powell,** who was recently named general manager of the El Segundo refinery to succeed **W. W. Davison,** recently elected vice president of Standard. A graduate of the University of Washington in engineering, Allen has been with Standard of California for more than 17 years.

Holbrook T. Ashton, manager of the central marketing region, comprising 16 midwestern states, for Socony - Vacuum Oil Co., Inc., was honored June 7 at the 109th commencement ceremonies of Miami University, Oxford, Ohio, "as a distinguished alumnus and in recognition of the services performed in connection with the gigantic oil industry and the services rendered in the war effort." Ashton entered the oil business in 1913 as assistant engineer of Columbus Gas & Fuel Co. of Columbus, Ohio. In 1917 he was codesigner of a plant for the manufacture of gasoline from natural gas. It was the largest such plant in existence at the time. Ashton was one of the organizers of the Natural Gasoline Association of America, and is the current president of the Western Petroleum Refiners Association. He was also one of the organizers of the 25-Year Club of the Petroleum Industry. During World War II Ashton served on many important committees of the Petroleum Administration for War to coordinate the industry's manpower and facilities.

Dr. A. P. Beutel, general manager of Dow Chemical Co.'s Texas division, Freeport, Tex., and **N. D. Griswold,** assistant general manager of the division, have been elected directors of the company. Dow operates one of the largest chemical-processing plants on the Gulf Coast in the Freeport-Velasco area using petroleum raw materials in many operations.

J. M. de la Garza Cárdenas, former general manager of production for Petroleos Mexicanos, Mexico, D. F., after a business tour in the United States has returned to Mexico. After almost a decade of service with Pemex as one of its top executives, de la Garza has entered the field of

PERSONALS

private business. He has opened an office at Morelos 37, Mexico, D. F., and will devote his time to engineering and commercial activities.

William C. Hawk, formerly geologist at Ventura, Calif., for Continental Oil Co., has been named assistant division geologist at Houston. **James B. Anderson,** geologist at Los Angeles for Continental, has been promoted to district geologist at Shreveport. He succeeds **Edgar W. Kimball,** who recently became division geologist at Houston. **Harry H. Hurd,** geologist for Continental in the home offices at Ponca City, Okla., has been named district geologist at Oklahoma City where he succeeds **W. Baxter Boyd,** who has been made division geologist at Fort Worth.

Hines H. Baker, recently elected president of Humble Oil & Refining Co., has been appointed chairman of the National Association of Manufacturers' consolidation program for 1948.

E. W. Cook, senior landman at Oklahoma City for Stanolind Oil & Gas Co., has been appointed district landman for the North Louisiana-Arkansas area at Shreveport.

William C. Hawk, geologist for Continental Oil Co. at Ventura, Calif., has been transferred to Houston as assistant division geologist.

J. B. Lovejoy, chief zone geologist in the Fort Worth office of Gulf Oil Corp., has been transferred to Pittsburgh, Pa., as staff geologist.

F. P. Castleberry, assistant division landman at Casper, Wyo., for Atlantic Refining Co., has been named division landman there to succeed **T. S. Pace,** who has been transferred to Dallas, Tex.

John Petty, geologist, Wichita Falls, Tex., has joined the Midland, Tex., office of Western Natural Gas Co.

James S. Noland, district landman for Phillips Petroleum Co. for West Texas and Southeast New Mexico, with headquarters at Midland, Tex., has resigned to become an independent oil operator. He will continue his headquarters at Midland.

Rae Preece, formerly field manager, drilling and producing department for Hancock Oil Co., Long Beach, Calif., has been named Mid-Continent division manager at San Antonio, Tex., where the company recently opened its Mid-Continent division office in the Alamo National Building.

C. A. CASH

C. A. Cash, chief engineer at Shamrock Oil & Gas Corp.'s McKee plants near Dumas, Tex., has been promoted to assistant to vice president in charge of operations. He will move to the company's headquarters offices in Amarillo, Tex., and will work with **Harry Wheeldon,** vice president in charge of operations. Announcement of Cash's promotion was made by **J. H. Dunn,** president of Shamrock Oil & Gas Corp.

Victor de Metz, president of Cie. Francaise des Petroles, has returned to Paris after a short business trip to New York.

Marshall F. Stiles, Jr., petroleum engineer with the U. S. Geological Survey, has been transferred from Tulsa to Oklahoma City.

Louis Wallace, in the geological department for Superior Oil Corp., has resigned to join Signal Oil & Gas Co. at Fort Worth to be in charge of exploration in the Mid-Continent area.

John W. Barker has joined the engineering staff of George Armistead, Jr., consulting chemical engineer of Washington, D. C. A graduate of Massachusetts Institute of Technology in 1941, Barker has specialized for several years in the design and engineering of refinery process units, as well as the supervision of pilot-plant research. He was formerly with Houdry Process Corp. and Foster Wheeler Corp. of New York City.

J. R. McCreary, assistant to the vice president in charge of crude oil purchasing department, St. Louis, Mo., Standard Oil Co. (Ohio), has been appointed assistant general manager of the department. **F. Ray Marshall,** staff assistant in supply and distribution, Cleveland, has been transferred to crude oil purchasing as staff assistant to **J. Frank Wilson,** vice president in charge.

C. R. Vegh Garzon, of Montevideo, Uruguay, has been appointed as consultant in Latin America for Universal Oil Products Co. Garzon, who founded the South American Petroleum Institute, has served since 1940 as president of the Uruguayan section and chairman of the International Council. He was formerly chief engineer and later general manager of A.N.C.A.P. He will continue to act as technical petroleum advisor to A.N.C.A.P.

J. B. Lawson, assistant general superintendent of operations for Great Lakes Pipe Line Co., has been named general superintendent to succeed **E. H. Skinner,** vice president for operations and general superintendent, who resigned recently. Lawson has been with Great Lakes since it was organized. Prior to joining Great Lakes he was field superintendent of the pipe-line department of Continental Oil Co., and before that was with Standard Oil Co. (Ind.), and Illinois Pipe Line Co.

E. W. Isom, director of research and development, Sinclair Refining Co., has been awarded the Medal of Merit by the Colorado School of Mines for "outstanding achievement."

New officers and the outgoing president of the Houston section, Society of Exploration Geophysicists: Jack C. Pollard, a partner in Robert H. Ray Co., first vice president; Roy L. Lay, assistant manager, geophysical division, The Texas Co., new president; Walter J. Osterhoudt, Gulf Research & Development Co., retiring president; Earle W. Johnson, president, General Geophysical Co., second vice president; Roy F. Bennett, chief geophysicist, Sohio Petroleum Co., secretary; and H. E. Banta, research geophysicist, Independent Exploration Co., treasurer

O. G. Frakes, with Globe Oil & Refining Co., at Oklahoma City, has moved to Ardmore, Okla., where he will open an office for the company.

R. H. ARNOLD

Ronald H. Arnold, who has been assisting **B. R. Jackson,** United States representative for Anglo-Iranian Oil Co., Ltd., as a deputy, in the New York office, will leave shortly for London. Following a 3-month vacation, Arnold probably will be reassigned to the Middle East. Arnold has served in China as the company's chief representative and as general administrative manager at the company's Abadan refinery.

Fern Fuson, with Ashland Oil & Refining Co., Inc., at Wichita Falls, Tex., has been named in charge of the company's new office at Shreveport, La.

Recent promotions of exploration and production personnel of Shell Oil Co., Inc., in the Houston area and on the regional staff include: **R. L. Bunch,** junior geologist, Tyler, to geologist; **R. R. Barr,** rotary driller, Sheridan, to drilling foreman; **T. P. Dowdy,** drilling foreman, Quitman, to district superintendent, Eagle Lake; **J. K. Moore,** scout, Houston, to chief scout; and **J. R. Randolph,** seismologist, Houston regional staff, to district seismologist, San Antonio.

John Lewis, in the Michigan geological department for Sohio Petroleum Co., has joined Chapman Oil Co. as geologist.

George Roth, senior geologist for Shell Oil Co., Inc., at Bakersfield, Calif., has resigned to become associated with **Ross Cabeen,** consulting geologist.

Lee Conroe has joined the West Texas district organization as landman for Hunt Oil Co. and affiliated interests.

Dr. Alfred M. Leeston, assistant in economic and foreign work to **E. L. DeGolyer,** petroleum geologist, has written and published a booklet entitled, "World Tour in Oil."

R. D. (Dan) Moriarty, chief of the materials department of the Creole Petroleum Corp., Caracas, Venezuela, recently arrived in the United States for a stay of several months. He will devote much of his time to business activities for his company, selecting men with experience in materials for employment in Venezuela.

SHIFTS—

Karl H. Bauer, superintendent, Natural Gasoline Co., Torrance to Tustin, Calif.; **Evan Watts,** foreman, Magnolia Petroleum Co., Aztec to Tohatchi, N. M.; **J. R. Patterson,** engineer, Shell Oil Co., Inc., Atlanta to Yoakum, Tex.; **V. H. LaPrade,** superintendent, Phillips Petroleum Co., Menard, Tex., to Roswell, N. M.; **E. Glenn Albright,** foreman, Atlantic Refining Co., Slaton to Rankin, Tex.; **J. W. Workman,** superintendent, Humble Oil & Refining Co., Beaumont to Monroe City, Tex.

Cecil C. Matthews, engineer, Seaboard Oil Co. of Delaware, Bishop to Midland, Tex.; **John E. Moore,** engineer, Standard Oil Co. (Ind.), Goose Creek to Baytown, Tex.; **E. B. Woodell,** superintendent, Humble Oil & Refining Co., Monroe City to Katy, Tex.; **J. Wm. Russell, Jr.,** engineer, Phillips Petroleum Co., Odessa, Tex., to Eureka, Kans.; **H. W. Roberson,** superintendent, Humble Oil & Refining Co., Overton to Wharton, Tex.; **Lewis L. Stallard,** engineer, Texoma Natural Gas Co., Stinnett to Fritch, Tex.

C. C. Johnston, superintendent, American Liberty Oil Co., Wichita Falls to Kilgore, Tex.; **E. M. Kuhn,** engineer, Reno Oil Co., Wichita Falls to McCamey, Tex.; **Thomas Ng,** engineer, Standard Oil Development Co., Baton Rouge, La., to Newark, N. J.; **Grant S. Darnell,** engineer, Stanolind Oil & Gas Co., Hackberry to Lake Charles, La.; **G. E. McClatchey,** engineer, Barnsdall Oil Co., Jennings to New Orleans, La.

M. G. Pitts, engineer, Marr Producing Co., Monroe, La., to Santa Susana, Calif.; **N. W. Engel,** geologist, Superior Oil Co., Evansville, Ind., to Caracas, Vene., S. A.; **Lincoln H. Riley,** superintendent, Humble Oil & Refining Co., Fayette to Brookhaven, Miss.; **Loyd Graham,** superintendent, Falcon Seaboard Drilling Co., Wellington, Kans., to New Martinsville, W. Va.; **Walter C. Jenneman,** engineer, The Texas Co., El Dorado, Kans., to Tulsa.

A. E. Benson, foreman, Amerada Petroleum Corp., Scott City, Kans., to Douglas, Wyo.; **O. R. Damon,** superintendent, Inland Empire Refineries, Inc., Cut Bank, Mont., to Salt Lake City, Utah; **Wilmer I. Bud Burch,** superintendent, Brinkerhoff Drilling Co., Cody to Midwest, Wyo.; **A. E. Berndes, Jr.,** geologist, The Texas Co., Alva, Okla., to San Diego, Calif.; **Ellsworth G. Skinner,** superintendent, Superior Oil Co., Lindsay, Okla., to Shafter, Calif.

DEATHS

John M. Underwood, 52, field superintendent for Pipeline Maintenance Construction Co., Houston, died June 3 in Houston.

W. A. Wood, 64, a statistician in the comptroller's department, The Texas Co., Houston, and an employe of the company nearly 35 years, died June 2 in Houston.

Edward H. Leroux, 73, president of Oklahoma Pipe Line Co. (now Interstate Oil Pipe Line Co.) before his retirement in 1938, died June 6 in Tulsa. A native of Rouseville, Pa., Leroux joined Oklahoma Pipe Line in 1909.

David Crawford, 46, vice president and controller of South Penn Oil Co., died June 4 in Pittsburgh, Pa. He had been with the company for 28 years.

Alvin C. Holmes, 62, formerly traffic manager for Cities Service Oil Co. at the company's Tulsa offices from 1917 to 1940, died recently in Bartlesville, Okla.

Edward C. Bertnolli, superintendent of communications for Great Lakes Pipe Line Co. since 1931, died May 21 in Kansas City, Mo.

James K. Crowell, 62, New York district manager for Dresser Manufacturing Division, Dresser Industries, Inc., Bradford, Pa., died May 25 in New York. He joined Dresser in 1929 as engineer of gas distribution.

Fielder Julliard Coffin, 64, former New York regional manager and former director of the foreign department for Sun Oil Co., died May 30 at Bay Island, Sarasota, Fla.

Albert A. Forster, 51, superintendent of the Jersey City Eagle Works Division, Esso Standard Oil Co., died June 2, in Plainfield, N. J. He was at one time general foreman of the company's Bayonne refinery, and had been with the company 20 years.

Leslie E. Schroeder, 49, secretary-treasurer of Atlas Refining Co., of Newark, N. J., died June 4 in New York.

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Universal Service Protects Your Refinery

Inhibitor Action IN CRANKCASE LUBRICANTS

by Dr. A. F. Prutton

A CRANKCASE lubricant has one primary positive function to perform, namely, to maintain a film of lubricant between moving engine parts which will prevent excessive friction and abrasion. A secondary positive action of the lubricant is to act as a coolant, thus preventing excessive temperatures in those engine parts contacted by the oil. In order to perform these positive functions adequately, the lubricant must possess the correct viscosities over the temperature ranges involved and be relatively stable as regards volatility, thermal decomposition, and oxidation.

In addition to its positive functions, the lubricant is called upon to prevent or materially retard many detrimental actions to engine parts or to engine operation which may occur in those sections of the engine where the lubricant freely circulates. Principal among these preventive functions of the lubricant are the retardation of oil oxidation, the prevention of harmful engine deposits, and reduction of corrosive actions upon metal components. Even though engine deposits and metal corrosion are due in some fair measure to partly oxidized fuel, the lubricant must bear a large share of responsibility in prevention of these detrimental actions. However, in those parts of the engine where lubricant circulation and contact are minor, other means must be provided to solve these serious problems.

The preparation of a high-quality crankcase lubricant, to meet modern demands adequately, presents many problems, and with contemplated changes in engine design, in fuels and in operating conditions, additional complications will arise. In this paper are considered broadly the functions of a crankcase lubricant, and details on the factors involved in producing a lubricant which will be relatively noncorrosive toward copper-lead alloy bearings. The author is with Case Institute of Technology, Cleveland, and this article was presented at the National Petroleum Association meeting at Cleveland, April 21-23, 1948.

In this paper, Inhibition of Corrosion, the discussion is confined to inhibition of metal corrosion, and in particular to the prevention of corrosion of copper-lead connecting-rod bearings. Shown in Table 1 are some of the principal corrosion problems which may arise in engine parts contacted by the crankcase lubricant, together with the possible harmful effects of these actions, the possible sources and nature of the corroding agents and some suggested means of reducing corrosion through changes in fuel or lubricant.

In general, these corrosion problems may be divided into those involving ferrous metals and those concerned with nonferrous metals. It is quite probable that ferrous-metal corrosion problems arise largely from an aqueous type of corrosion by inorganic corroding agents or by low-molecular-weight or water-soluble organic acids. Since the majority of these types of compounds arise from the fuel, major responsibilities as to **cause** may be attributed to the fuel, but this does not reduce the responsibility of the lubricant in preventing such corrosive actions. **If recent trends in fuel compositions persist, extremely high concentrations of corrective additives may be required in the lubricant.**

Certain of the nonferrous metals, namely the alloy bearing metals such as copper-lead and high-cadmium alloys, are particularly sensitive to attack by oil-soluble organic acids under certain conditions. In such corrosive action the lead (or cadmium) phase is selectively corroded and eventually results in bearing failure. Recently a new type of high-temperature bearing corrosion has appeared which seems to be due to the action of active sulfur in the oil upon even the copper and silver phases.

TABLE 1—CRANKCASE CORROSION INHIBITION PROBLEMS

PART CORRODING	HARMFUL EFFECT OF CORROSIVE ACTION	POSSIBLE SOURCES AND NATURE OF CORRODING AGENTS	SUGGESTED MEANS OF CORRECTING CORROSION OTHER THAN ENGINE DESIGN OR OPERATING CONDITIONS
1. FERROUS METAL COMPONENTS		○ O_2 ○ H_2O	
a) CYLINDER WALLS AND RINGS	DECREASES ENGINE EFFICIENCY AND INCREASES BLOWBY	○ SO_2 ○ SO_3 or H_2SO_4 ○ HCl ○ HBr	INHIBITORS IN OIL INHIBITORS IN FUELS FUEL REFINING OR FUEL COMPOSITION
b) PISTON CORROSION	ENGINE FAILURE	○ LOW MOLECULAR WEIGHT ORGANIC ACIDS	
c) WRISTPINS VALVE STEMS AND GUIDES CRANKSHAFT	INCREASES CLEARANCE AND HASTENS MECHANICAL FAILURE	○ OXIDES OF NITROGEN	
d) CRANKCASE, SIDEPLATES AND PAN	POSSIBLE SOURCE OF INCREASED OIL CONTAMINATION AND DETERIORATION		
2. NON-FERROUS METALS ALLOY BEARINGS SUCH AS Cu-Pb, Cd-Ag, Cd-Ni, ETC.	BEARING FAILURE	○ LEAD SOAPS ○ ORGANIC ACIDS ORGANIC PEROXIDES ○ O_2	INHIBITORS IN OIL
		○ =FROM FUEL OR BLOWBY • =FROM OIL • =CRANKCASE VENTILATION	

Copper-Lead Bearing Corrosion

Copper-lead bearings are in considerable commercial use in heavy-duty equipment, and it is well known that effective corrosion-inhibited crankcase oils must be employed in this service. The principal corrosion difficulty encountered in the use of these bearings is due to a selective leaching out of the lead phase by the corroding oil medium.

Extensive studies have been conducted in our laboratories upon the corrosion of pure lead[1,4,5] and of copper-lead bearing metal[2,3] by hydrocarbon solutions. Tabulated below are some of the general conclusions of this work:

1. Corrosion of pure lead and corrosion of the lead phase of copper-lead bearing metal, so far as we can determine, follow the same mechanism.

2. Corrosion of lead in a hydrocarbon medium requires that **both an organic acid and an oxidizing agent be present.**

3. Oxidizing agents which have been found to be capable of active corrosion of lead, when present with an organic acid, include: oxygen, organic peroxides, organic nitrocompounds, quinone, and diacetyl.

4. Organic acids are active participants in this corroding action. At **high concentrations of oxidizing agent,** as the concentration of low-molecular-weight acids such as acetic is increased progressively, the rate of corrosion rapidly increases. At higher acid concentrations the rate decreases to a steady low value. However, with high-molecular-weight acids, as the concentration is increased, corrosion rates remain low until a "critical" concentration is reached where the corrosion rate increases rapidly to a high and quite constant value for higher acid concentrations.

5. A minute concentration of low-molecular-weight active acid added to a solution of high-molecular acid well below its "critical" concentration, acts catalytically to produce an unexpectedly high rate of corrosion. Oil oxidation yields acidic substances of various types and molecular weights, therefore it would appear from the above information that the use of a neutralization number as a criterion of the corrosive tendency of a crankcase lubricant should be seriously questioned (see Fig. 1).

In addition to yielding acids, lubricant oxidation is generally accepted to produce organic hydroperoxides as intermediate products. Thus from oil oxidation, both active corroding agents required for typical copper-lead bearing corrosion are produced.

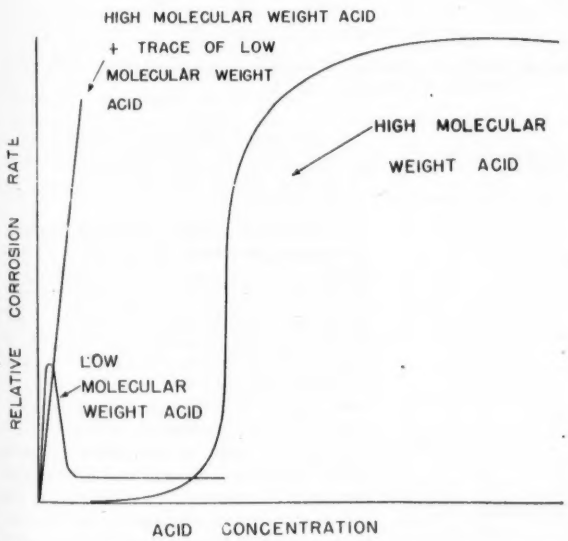

Fig. 1—Corrosion of lead by organic acids at high oxidizing-agent concentration

TABLE 2—COMMERCIAL BEARING CORROSION INHIBITORS STUDIED

DESIGNATION	TYPE	CHEMICAL COMPOSITION				% BY WEIGHT OF INHIBITOR IN CRANKCASE LUBRICANT
		% S	% P	% Zn	% $CaSO_4$ ASH	
A	ORGANIC PHOSPHITE	—	10.3	—	—	0.09
B	ORGANIC PHOSPHORUS SULFUR COMPOUND	13.7	5.0	—	—	0.60
C	ZINC ORGANIC DITHIOPHOSPHATE	7.6	3.4	3.7	—	1.20
D	METAL PHENATE SULFIDE	2.6	—	—	7.0	2.04
E	METAL PHENATE	—	—	—	5.5	4.20

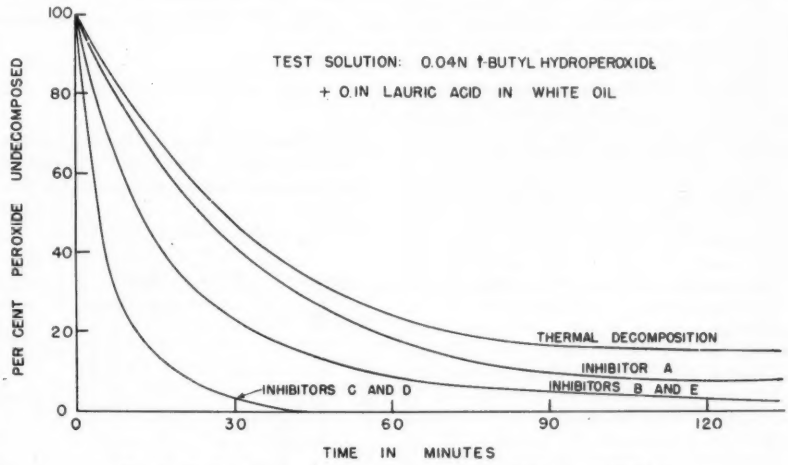

Fig. 2—Reduction of peroxide by corrosion inhibitors at 100° C.

How Do Corrosion Inhibitors Act?

With the previous conclusions in mind, one may postulate several possible methods by which a corrosion inhibitor might act. It is believed that corrosion inhibitors for alloy bearings perform their function through one or more of the following mechanisms:

1. By chemical or catalytic reduction of oxidizing agents in the oil solution.

2. By formation of an inhibiting film on the bearing surface, which will reduce corrosion by:

(a) Acting as an impervious barrier to diffusion of corroding agents into lead surfaces.

(b) Catalytic or chemical reaction of the film with oxidizing agents diffusing in toward the lead surfaces.

3. By modification of the oxidation of the lubricant to yield reduced amounts of corrosive acidic products through:

(a) Reduction of total oil oxidation (1) antioxidant action; (2) elimination of the catalytic effect of metals and metal compounds on oxidation.

(b) Modification of the course of oil oxidation to yield less active corroding agents.

Examination of Commercial Inhibitors

A study was made involving five different types of commercially used crankcase corrosion inhibitors to determine how each one performed its inhibiting action. Although wide variations in inhibitory efficiency have been noted with these five inhibitors, each has been found satisfactory in certain types of service.

Table 2 gives the general nature and compositions of the inhibitors employed in this work, and the normal percentages by weight in which each is used in crankcase oil.

A. Reduction of organic peroxide by inhibitors.—The effectiveness of each inhibitor on reducing a typical peroxide, tertiary butyl hydroperox-

ide, in hydrocarbon solution at 100° C. was determined. These data are shown in Fig. 2, indicating a wide difference in reduction rates between the different inhibitors. Inhibitors C and D show the most rapid rate of peroxide reduction with A as the slowest and the other inhibitors show intermediate values.

Higher temperatures, which would be more typical of actual bearing conditions, might change the relative effectiveness of the various inhibitors in this reducing action; however, there is no doubt but that all inhibitors, except A, would undoubtedly exert at least partial corrosion control through their reducing action upon peroxides or oxygen.

An inhibitor which will react with oxidizing agents at low temperatures might not have sufficient permanence to persist in the crankcase oil between changes. Comparing inhibitor B with inhibitor C, one finds that C is most active in peroxide reduction and also is less efficient in crankcase use when comparison is based on the percentage of active ingredients, sulfur and phosphorus. An oil blended with 1.20 per cent of C by weight contains .132 per cent phosphorus plus sulfur, while the commercial concentration of inhibitor B in oil yields a solution with .112 per cent sulfur plus phosphorus. Thus a considerably greater quantity of active elements in inhibitor C is required than in inhibitor B. It also will be noted that .60 per cent of inhibitor B has much greater inhibiting efficiency than 1.20 per cent of C in the L 4 engine test data presented later.

B. Study of oil inhibitor films on bearing metal.—Standard test cylinders of F-14 copper-lead bearing metal (obtained through the courtesy of Cleveland Graphite Bronze Co.), accurately machined with a standard dry grinding finish, were immersed in separate hydrocarbon solutions of the five inhibitors studied at 140° C. for 5 hours. Each of the inhibitors gave easily detected surface films, with B and C yielding dark-colored films, A a light grayish film, and D and E light orange-colored surfaces. In this treatment the cylinders showed very slight changes in weight, on the order of a few milligrams or less.

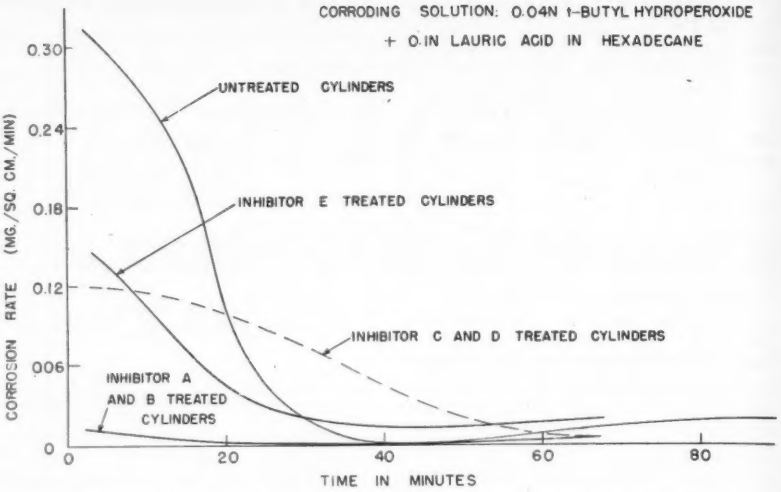

Fig. 4—Corrosion rate at 100° C. of inhibitor-treated Cu-Pb test cylinders

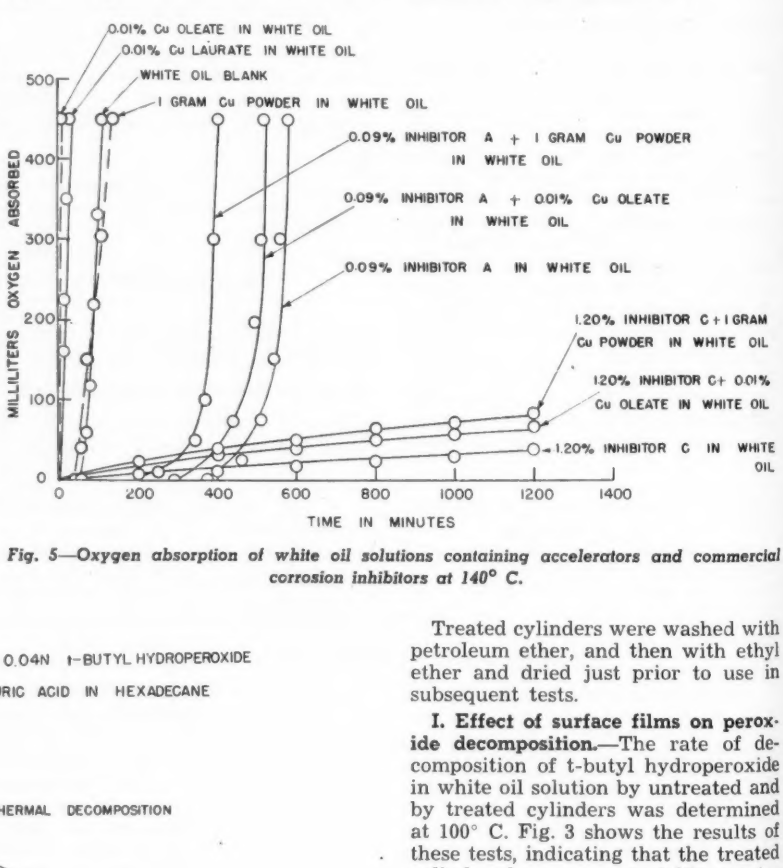

Fig. 5—Oxygen absorption of white oil solutions containing accelerators and commercial corrosion inhibitors at 140° C.

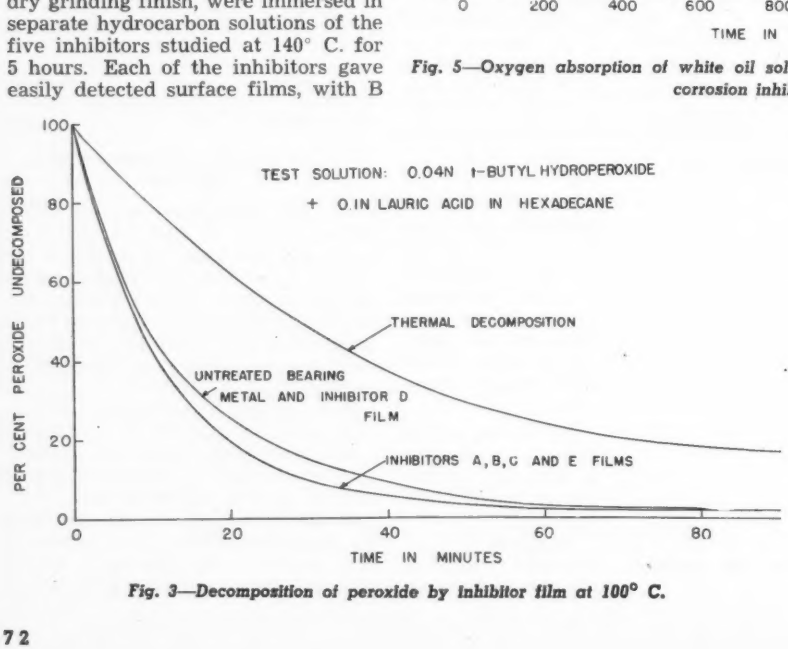

Fig. 3—Decomposition of peroxide by inhibitor film at 100° C.

Treated cylinders were washed with petroleum ether, and then with ethyl ether and dried just prior to use in subsequent tests.

I. Effect of surface films on peroxide decomposition.—The rate of decomposition of t-butyl hydroperoxide in white oil solution by untreated and by treated cylinders was determined at 100° C. Fig. 3 shows the results of these tests, indicating that the treated cylinders have no appreciably greater reducing rate upon the peroxide used than does an untreated cylinder.

Further work on cylinders treated with inhibitor B showed that the amounts of phosphorus and sulfur on the surface of a treated cylinder before and after immersion in the peroxide containing solution were substantially the same. Therefore, for

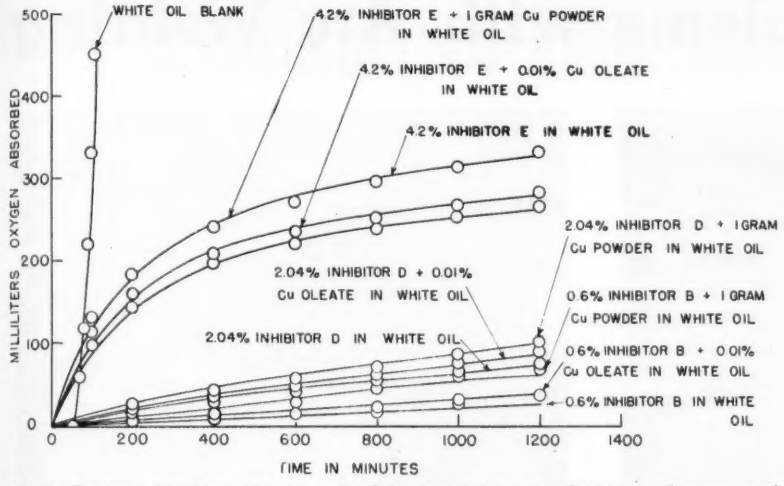
WHITE OIL BLANK
4.2% INHIBITOR E + 1 GRAM Cu POWDER IN WHITE OIL
4.2% INHIBITOR E + 0.01% Cu OLEATE IN WHITE OIL
4.2% INHIBITOR E IN WHITE OIL
2.04% INHIBITOR D + 1 GRAM Cu POWDER IN WHITE OIL
2.04% INHIBITOR D + 0.01% Cu OLEATE IN WHITE OIL
0.6% INHIBITOR B + 1 GRAM Cu POWDER IN WHITE OIL
2.04% INHIBITOR D IN WHITE OIL
0.6% INHIBITOR B + 0.01% Cu OLEATE IN WHITE OIL
0.6% INHIBITOR B IN WHITE OIL
MILLILITERS OXYGEN ABSORBED
TIME IN MINUTES
0
100
200
300
400
500
0
200
400
600
800
1000
1200
1400

Fig. 6—Oxygen absorption of white oil solutions containing accelerators and commercial corrosion inhibitors at 140° C.

films produced by this inhibitor, the peroxide loss from solution was not due to chemical reduction of peroxide by the active inhibitor elements, phosphorus and sulfur.

II. Effect of inhibitor films on initial corrosion rates.—A highly corrosive medium, 0.1 N Lauric acid and 0.04 N t-butyl hydroperoxide in white oil, was contacted with bearing metal cylinders which had freshly prepared inhibitor films, and the rate of corrosion determined at several time intervals.

As evidenced (Fig. 4) by the very high rate of attack upon a blank cylinder of bearing metal, this solution is highly corrosive upon copper-lead bearing metal, while its peroxide concentration is high.

In this highly corrosive solution, with vigorous agitation to eliminate the main diffusional resistances, the inhibitor reaction films produced by inhibitors A and B did not permit corrosive attack on the bearing metal. Since the inhibitor film has no greater chemical or catalytic activity on peroxide decomposition than the bearing metal itself, **it is obvious that these two inhibitor films are practically impervious to one or more of the corroding agents.** Inhibitors C, D, and E gave films which had some permeability, but which did act to give definite corrosion retardation.

III. Effect of corrosion inhibitors on oil oxidation.—Although this phase of the study has not been completed in all its aspects, certain data are available and tentative conclusions may be drawn therefrom:

1. All of the corrosion inhibitors reduce the rate of oxygen absorption by white oil and pure hexadecane at 140° C.

2. All of the inhibitors prevent any excessive catalytic action by copper metal or soluble copper salts at 140° C.

Data from which these conclusions were arrived at are shown in Figs. 5 and 6.

It appears from these test data that all of the corrosion inhibitors studied have some effect in reducing oxygen absorption and in deactivating metal oxidation catalysts. Inhibitors B, C, and D are outstanding in these qualities, while A and E are reasonably active.

Factors in Corrosion Inhibitors

A corrosion inhibitor suitable for use in lubricants on copper-lead bearings must inhibit bearing corrosion over reasonably long periods of service operation and must not produce any serious detrimental effects upon lubricant stability or performance. Any adverse effect upon ring or cylinder wear, detergency, engine deposits, oil oxidation or sludge formation, foaming, valve burning, corrosion of other metal parts, must be considered when choice is made between different inhibitors.

As a partial answer to these additional questions, standard L 4 Chevrolet tests were made upon blends of the five inhibitors studied in a solvent-extracted Mid-Continent S.A.E.-30 base oil. Standard inhibitor concentrations as shown in Table 3 were used. A standard leaded gasoline

(Continued on page 103)

TABLE 3—CHEVROLET L 4 TEST DATA ON INHIBITOR-TREATED OILS

PART 1

INHIBITOR	PER CENT INHIBITOR USED	ENGINE INSPECTION DATA		
		OVERALL RATING	PISTON RATING	BEARING CORROSION LOSS (MG/BEARING)
A	09	86.0	8.5	FAILED
B	.60	86.5	7.5	102
C	1.20	89.0	8.5	487
D	2.04	87.5	8.5	FAILED
E	4.20	83.0	8.0	950
BASE OIL		87.5	8.5	FAILED

PART 2

INHIBITOR	DRAIN ANALYSES 36 HOURS								
	PER CENT P LOST	PER CENT Cu LOST	CONR. CARBON INCREASE	INCREASE IN NEUT. NUMBER	PER CENT INORGANIC INSOL.	PER CENT BENZENE INSOL.	PER CENT PENTANE INSOL.	INSOL. RESINS	PER CENT VISCOSITY INCREASE
A	32	—	2.55	2.06	.42	.71	2.20	1.49	59
B	29	—	1.73	2.09	.42	.54	1.48	.94	46
C	34	—	1.46	.97	.28	.35	.93	.58	33
D	—	10	2.87	1.84	48	.67	2.34	1.67	54
E	—	30	2.48	3.71	.50	.62	2.60	1.98	81
BASE OIL			2.19	1.47	.54	.70	1.56	.86	45

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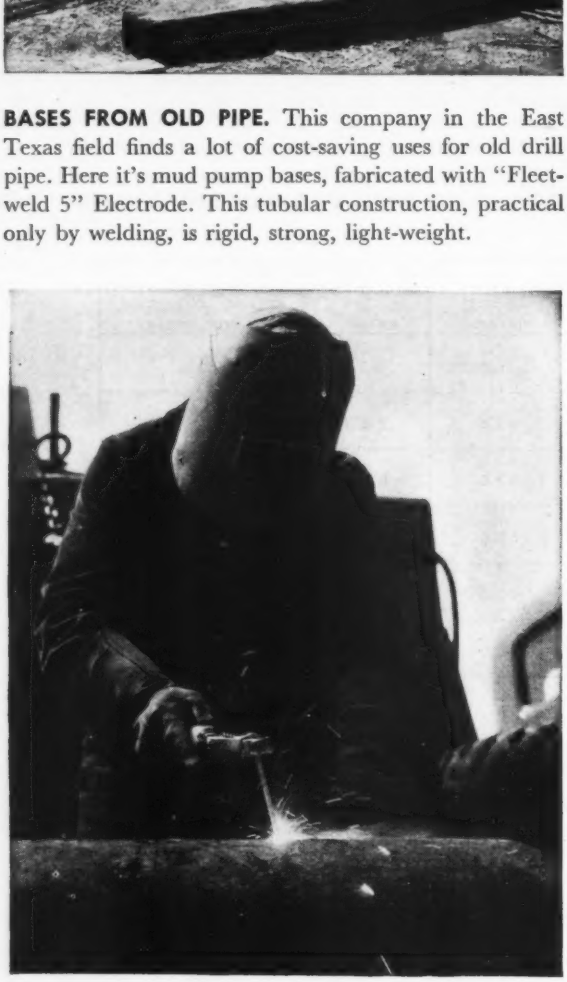

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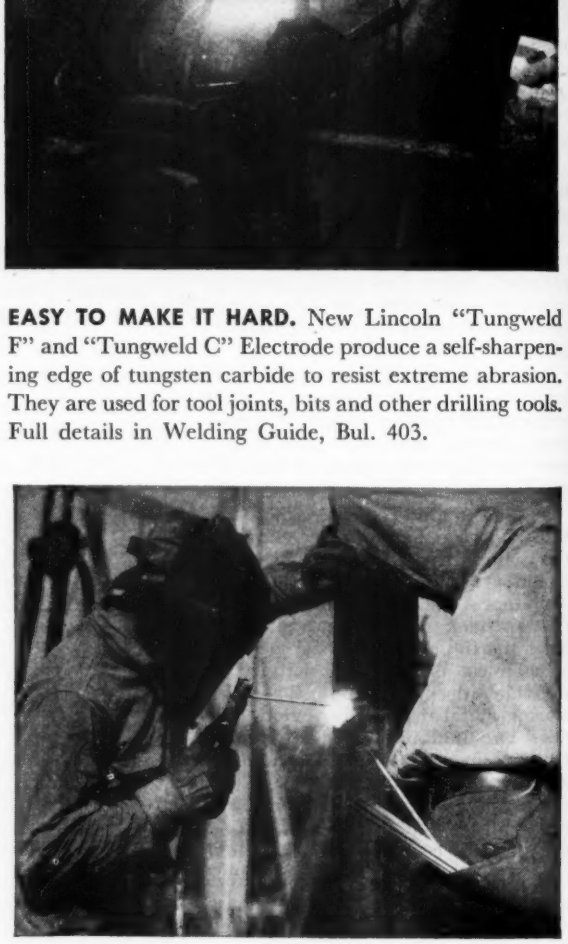

IMPROVES CASING. Arc welding permits use of plain end casing, gets 100% joint efficiency, eliminates leakage and permits closer tolerance between casing and hole. Joints of this 6" casing are welded in 3½ minutes with Lincoln "Fleetweld 5" Electrode.

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Advertisement

A Subsurface Flow-Rate Indicator

. . . And Its Application

by F. M. Carlisle

EQUIPMENT to determine subsurface flow rates is described and its application to field problems is discussed. This equipment makes it possible to determine accurately the points or zones of fluid entry in producing wells and the points or zones of fluid exit in injection wells. The equipment is essentially a turbine, the rotor or runner of which is turned by fluid movement in either direction. The rotation of the runner interrupts an electric circuit and these interruptions are indicated at the surface on an electronic indicator and counter. The author is with International Cementers, Inc., Long Beach, Calif., and this paper was given at the 1948 spring A.P.I. meeting, Pacific Coast District, Los Angeles.

IT has long been a problem in oil production to locate zones of fluid ingress and egress. This is also true as regards drilling of wells where lost circulation is a problem. In the original completion of wells the relative permeabilities of streaks and zones are indicated by a variety of suitable instruments. However, as the life of a well progresses, these indicated relative permeabilities may and usually do change, due to a variety of factors.

The presently described apparatus is the outgrowth of a desire for additional information on the point of entry and rate of flow of fluid within the well bore.

The method used with the apparatus herein described will indicate with certainty the following conditions within a well:

1. Lost circulation even though there may be two or more intervals simultaneously taking fluid.
2. Holes in pipe—provided fluid may be pumped into these holes or that fluid is emerging therefrom at a rate above the minimum velocity of 3 ft. per minute in the pipe. Several holes are often indicated on the same traverse of the well bore.
3. The relative permeability of the different intervals in wells in an injection project, whether the injected medium be gas or liquid.
4. The relative permeability of producing intervals of wells while in the producing state. Thief zones are sometimes discovered where the producing interval covers more than one zone.

The apparatus has been used to locate points of gas entry in wells that have an abnormally high gas-oil ratio.

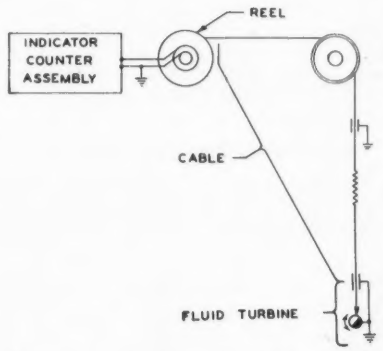

Fig. 2—Schematic electrical diagram

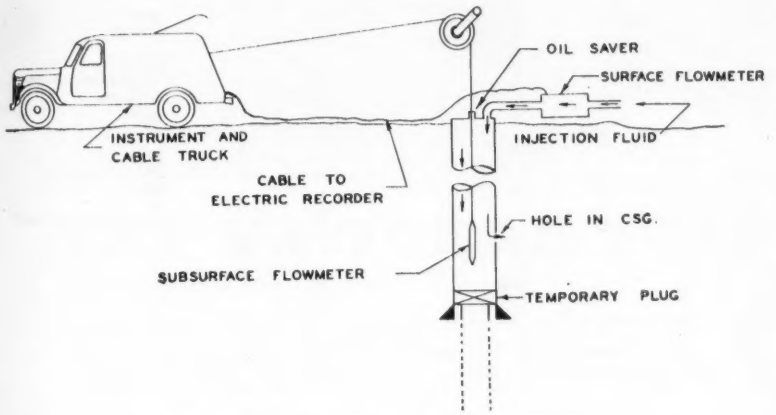

Fig. 1—Subsurface flow rate indicator apparatus

Equipment

A schematic diagram of the apparatus used to measure subsurface flow rates is shown in Fig. 1. It is composed essentially of a small fluid turbine which is connected electrically to an indicator and counter assembly at the surface, Fig. 2.

The small fluid turbine has a rotating shaft which is turned when fluids actuate the runner attached to the shaft. The shaft runs through a packingless seal and into an inner chamber where the circuit interrupter or make-and-break contact is immersed in a light-weight dielectric fluid of low viscosity which allows free turning of the shaft and prevents well fluids from short circuiting the contact assembly.

With a seal such as is described, the changing pressure of well fluids is transmitted into the inner chamber and there is no differential pressure between the inside and outside of the instrument.

The interrupter assembly at the upper end of the rotating shaft member is easily changed to provide more interruptions per revolution and will, therefore, indicate very slight movement of the runner and shaft.

The present down-hole instrument is capable of measuring liquid velocities with a minimum rate of flow of 3 ft. per minute and has been used successfully where the gas velocity had a minimum value of 12 ft. per minute.

A guide or shoe at the lower end of the case prevents lodging of the tool on liner tops, etc. The instrument is 3¾ in. in diameter and 17 in. long.

The electrical circuit to the surface is maintained in a single conductor armored cable, which is spooled on a reel with a capacity of 17,000 ft. of 5/16-in. diameter cable. Cable used is Amergraph reverse concentric type, which has a minimum tensile strength of approximately 9,000 lb. The reel is mounted within an enclosed truck body of the instrument and cable truck, together with accessory electrodes, sheaves, etc.

The indicator and counter assembly provides the electrical energy necessary to indicate and count the revolutions through which the runner of the turbine has turned. An electrical timer is provided, which will start and automatically stop the impulse

register at any time setting from 0 to 60 seconds. Thus, an r.p.m. count of the turbine will remain registered until the register is manually returned to zero. Movement of fluid is also indicated by the milliammeter and by the neon-light indicator.

Any input or produced liquid may be measured at the surface with a recording electrical flow meter, which consists of an orifice and armature assembly, and an electric recorder.

Field Procedure

Injection wells.—After all tubing is removed from the well, the downhole instrument is filled with a light oil and tested to be sure of proper contact operation and proper bearing adjustment. The cable is then threaded through the two sheaves, one on the floor and the measuring sheave in the derrick, and the socket is screwed onto the pin of the subsurface flow meter. The runner is again turned by hand to test the entire electrical circuit which includes the cable and the indicator and counter assembly in the instrument truck.

The instrument is started into the hole through an oil saver which is designed to stand considerable pressure while permitting the line to move relatively free.

The injection of fluid is resumed and the instrument is lowered to the interval at which the survey is to be started. However, it is good procedure to provide a lubricator above the well head in order that injection of fluid is not interrupted, and, therefore the injection equilibrium is not disturbed.

The traverse of the section to be surveyed may be made from the bottom up the hole or from the top down. Either traverse should give an exact duplicate of the other, if all other factors are the same. Traversing the section should be accomplished in steps, so chosen as to permit of a complete traverse in a relatively short period of time.

If abrupt changes are noticed while making the traverse, they should be investigated by decreasing the steps to such a value as will permit location of the exact point of change. The entire traverse may be completed using the first chosen steps to first obtain a general picture and then rerun in the "intervals of question" to define the abruptness and limits of such anomalies. In addition, problems of lost circulation and holes in pipe are readily solved in the above manner.

Producing wells.—Producing wells may be surveyed with presently available equipment by providing an offset type of tubing-head which will separate the tubing and cable and provide for a packoff of both. The procedure for a producing well differs materially in that after the tubing is pulled from the well the cable is threaded through the sheaves in the same manner as previously related and then through an offset tubing-head assembly. The instrument is then lowered to the interval to be surveyed and the tubing is returned to the hole.

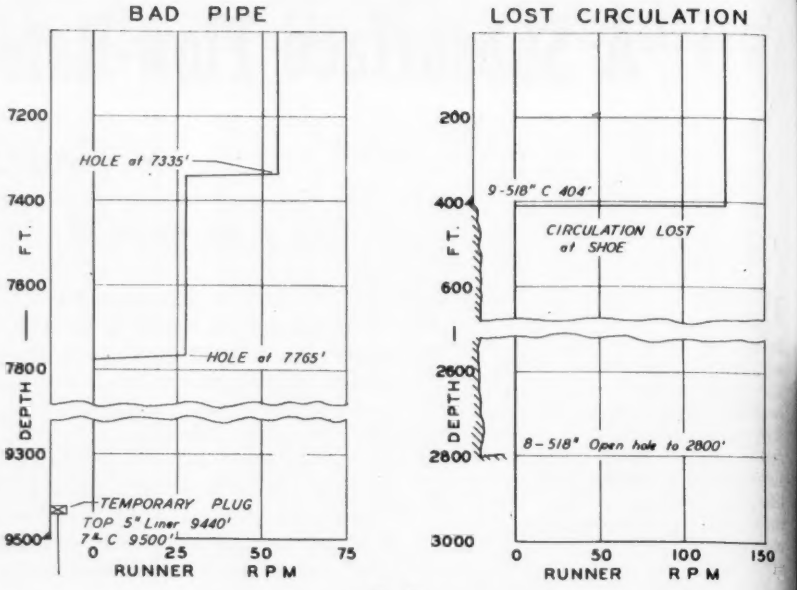

Fig. 3

The offset type of tubing head permits the packoff of both cable and tubing under producing conditions. The entire tubing string may be rotated while in place with such a tubing head. Erratic readings may result in cases where there is an entry of gas provided it is in the gaseous state at that point and, as such, the points of gas entry are delineated.

Examples of Flow Rate Surveys

Typical examples of the graph obtained by plotting the data from a traverse are shown for four different problems in Figs. 3 and 4. It will be noted that in Fig. 3 the r.p.m. of the runner is plotted versus the depth of the well. This method gives a qualitative indication of the fluid loss and is sufficient to show the desired information.

The two examples in Fig. 4 are plotted somewhat differently due to the desire for a more quantitative analysis of the traverse. In Fig. 4, the term "injection capacity" refers to the ability of the individual interval to accept fluid in percentage of the total fluid being injected into the well bore.

The slope of the line in the line graph at the left of each of these examples indicates the relative permeability of that particular interval in

(Continued on page 103)

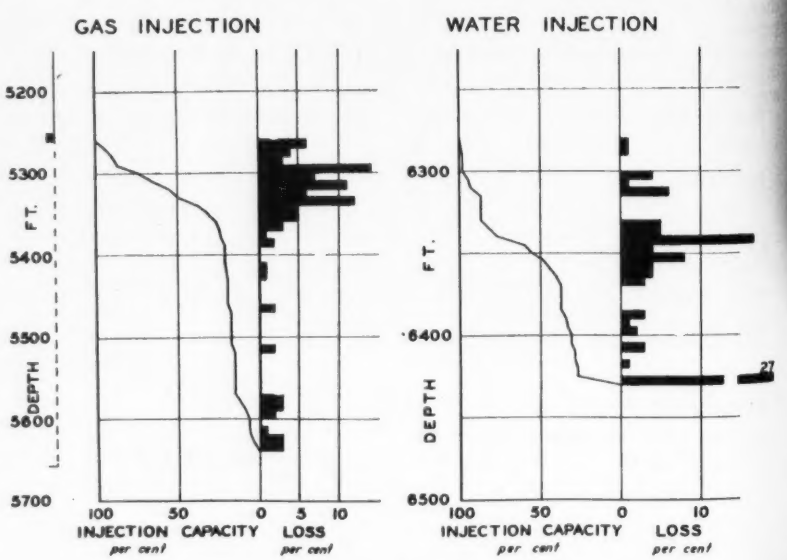

Fig. 4

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LINE OF OIL FIELD EQUIPMENT ★ FOR PRODUCTION

Rod Pumping

.... Factors on Rods, Tubing, Pumps, Units

by K. T. McCamman

THE author, with Shell Oil Co., Inc., Bakersfield, Calif., discusses rod fall, and the strengths of sucker rods, tubing, pumping units, and pumps as they affect the amount of fluid that can be pumped from any depth. Curves showing quantitatively those limitations of the sucker-rod pumping system are presented. A few examples of actual pumping performance are given.

It is concluded that the amount of fluid that can be pumped from depths less than 1,700 ft. is limited by the speed of rod fall. The amount that can be pumped from greater depths is limited by the working strength of sucker rods. The development of 40,000-psi.-working-stress rods has made possible a large increase in the amount that can be pumped from below 9,000 ft. This paper is from the 1948 spring A.P.I. meeting held at Los Angeles.

IN view of the increasing depths of the wells that are ceasing natural flow, and the present demand for maximum production, it is probably not out of place to discuss what can and cannot be produced by means of sucker-rod pumping. This paper discusses the limitation inherent in this method of producing because of rod fall, and the limitations placed upon the pumping system by the present strengths of sucker rods, tubing, pumps, and pumping units.

Throughout the paper an attempt is made to confine assumptions so they are in accord with common practice in California. The possibilities in the use of rods smaller than ¾ in., or larger than 1 in., are not covered, as these rods are not commonly used in California. Similarly, no mention is made of the possibilities from stroke lengths greater than 240 in. or plunger sizes of more than 4¾ in.

Rod Fall

There is a definite speed for any particular pumping installation at which the carrier bar and polished-rod clamp will just stay in contact on the downstroke; at greater speeds the rods will not fall as fast as the carrier bar. Because rods will not operate in compression satisfactorily, the speed at which the system can operate is limited by the rate at which the rods and plunger will fall by gravity to the bottom of the stroke.

If the rods and plunger were falling freely in a vacuum, they would be accelerated by gravity at 32 ft. per second. If the rods would accelerate uniformly at this rate for the first one-half of the downstroke, and if the first one-half of the downstroke took one-fourth of the time of a complete cycle, the laws of freely falling bodies would indicate that pumping could be done at, for example, thirty-six 66-in. strokes per minute, or at twenty-seven 120-in. strokes per minute. Actually the motion of the rods and plunger is opposed, principally, by friction around the rods and in the pump, and a unit cannot be operated this fast satisfactorily. Several wells that were run at the speed at which the polished-rod clamp and carrier bar started separating, indicated that the practical limit on speed is about 75 per cent of the speed determined for a freely falling body, or for example, approximately twenty-seven 66-in. strokes per minute, or twenty 120-in. strokes per minute.

Fig. 1 shows production rate against depth as limited by rod fall for these two speeds and stroke lengths. Production rates were computed by assuming that the fluid was water; rod string was all 1 in.; volumetric efficiency of the pump was 80 per cent; tubing was anchored; and the maximum size plunger available was 4¾ in. The optimum plunger size was used and the plunger over-travel and rod stretch were taken into consideration.[1]

It is interesting to note that at all depths the longer stroke length permits a higher production rate, although the shorter stroke length is run at a faster speed. This is due to the fact that the plunger accelerates for approximately one-half the stroke length; the longer stroke therefore can have a faster maximum and average speed, and a greater displacement.

Rod String

In computing the limitation the working strength of the rod string places upon rod pumping it is necessary to have an expression for the maximum stress developed in the rods and know what stress present-day rods will stand. In this paper the Mills formula[2] is used to compute maximum stress. This formula is a simplified expression for an extremely complicated problem. It does give, in general, reasonably accurate results. It makes no allowance for the possibility of the reflected loads in the rod string being in phase with the imposed loads[3]; when this occurs the maximum stress indicated by the Mills formula may be appreciably exceeded. It is considered good practice to select the speed of a heavily loaded rod string so that reflected and imposed loads are out of phase.

Conventional alloy-steel rods normally give satisfactory service at maximum stresses up to 30,000 psi. In noncorrosive wells, particularly when maximum and minimum rods stresses are not too widely different, satisfactory service is obtained at stresses up to 34,000 psi. In corrosive wells, or where the minimum rod stress is fairly low, satisfactory service is limited to less than 26,000 psi.

Somewhat over a year ago several rod manufacturers placed on the market, for test, new rods of a higher strength steel. From the results of laboratory corrosion fatigue tests, these rods should withstand maximum operating stresses up to 40,000 psi. They are still undergoing field tests, and while they have not fully proved themselves, results to date indicate that they probably will give good service at stresses up to 40,000 psi. under favorable conditions.

Tapered Rod Strings

A 9,300-ft. string of rods of uniform size hanging freely in water has a stress of 30,000 psi. in the top rod. As this stress would increase if the rod

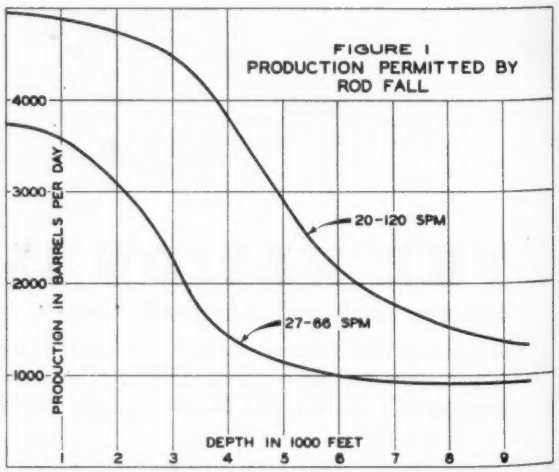


FIGURE 1
PRODUCTION PERMITTED BY ROD FALL

string were moved, or if a plunger on the bottom of the string were supporting any fluid weight, it is obvious that uniform size strings of rods are not adapted to deep wells. In practice, strings over 5,000 ft. long are composed normally of two or three sizes, the length of each size being selected to give approximately equal stress in the top rod of each size.

Fig. 2 was computed to show the limitations placed upon production by working strength of the rod string. The three curves show production possible with (1) a 120-in. stroke and rods stressed to 30,000 psi.; (2) a 240-in. stroke and rods stressed to 30,000 psi.; and (3) a 240-in. stroke and rods stressed to 40,000 psi. Production rates were computed by assuming that the tubing was anchored; possible plunger sizes were from 1 to 4¾ in.; volumetric pump efficiency was 80 per cent; the rod string was composed of 1-in. rods at depths of 5,000 ft. or less; and the rod string was properly tapered using 1-in., ⅞-in., and ¾-in. rods at depths of over 5,000 ft.

It is interesting to note that pumping cannot be done from below about 11,500 ft. with rods stressed to 30,000 psi. regardless of stroke length, while it can be done from about 15,500 ft. with rods stressed to 40,000 psi. At these depths rod weight and fluid weight, without any acceleration load, develops these maximum stresses in the rods. Development of 40,000-psi.-working-strength rods, assuming that it is being satisfactorily accomplished, has thus not only permitted a large increase in the amount that can be pumped in the total depth range of 9,000 to 11,000 ft. but has opened the possibility of pumping from several thousand feet deeper.

Tubing used in rod pumping is subjected to two types of loading that could cause failure; the pressure of the fluid it contains might burst it, or the weight it supports might pull it in two.

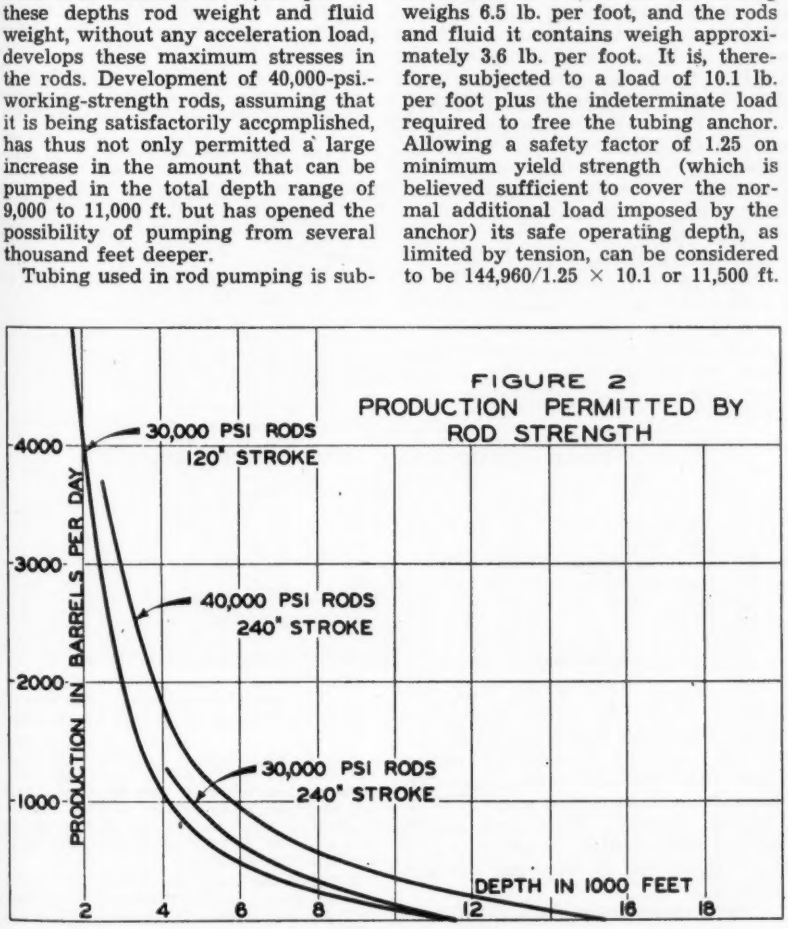
In normal pumping and well pulling operations the maximum internal pressure applied to the tubing will approximate the static pressure of a column of water of the same length as the tubing. Grade N80 external upset tubing, 2½ in. nominal diameter, will withstand a minimum internal pressure of 10,570 psi.[4] Allowing a safety factor of 1.5, it can be considered to be strong enough to withstand an operating pressure of 7,030 psi., which is the hydrostatic head at 16,300 ft. Other sizes of N80 tubing are of approximately the same strength. Tubing, then, as far as bursting strength is concerned, permits pumping from about 16,000 ft.

In normal operations the maximum weight is placed upon tubing during a stripping job, when the pump is sanded up or otherwise stuck. Under these conditions the load on the tubing will approach the sum of its own weight, the weight of the fluid it contains, the weight of the rod string, and the force required to release the tubing anchor.

Grade N80, 2½-in., external upset tubing has a minimum yield strength in tension of 144,960 lb. The tubing weighs 6.5 lb. per foot, and the rods and fluid it contains weigh approximately 3.6 lb. per foot. It is, therefore, subjected to a load of 10.1 lb. per foot plus the indeterminate load required to free the tubing anchor. Allowing a safety factor of 1.25 on minimum yield strength (which is believed sufficient to cover the normal additional load imposed by the anchor) its safe operating depth, as limited by tension, can be considered to be 144,960/1.25 × 10.1 or 11,500 ft. Other sizes of N80 tubing have approximately the same strength-to-weight ratio, and can be used to comparable depths.

When it is necessary to pump from depths greater than 11,500 ft., a tapered string consisting of two or more sizes of tubing should be used. For example, a tapered string of 2½ and 2-in. at 14,500 ft., or of 3, 2½, and 2-in. at 17,900 ft., has a safety factor of approximately 1.25 during a stripping job.

Present-day tubing, therefore, permits pumping from as deep as 16,000 ft. if the casing size allows use of a properly tapered string. This is about 500 ft. deeper than rods can operate; consequently tubing strength is not a major limitation of rod pumping.



Pumping Unit

One rather large pumping unit has the following specifications:

Maximum stroke, in.	120
A.P.I. beam rating, lb.	33,900
Gear rating, in.-lb. peak torque	850,000
Maximum counterbalance, lb. (at 120-in. stroke)	24,300

The beam strength of this unit will permit stressing a 1-in. rod to 43,200 psi. or some 3,200 psi. in excess of the maximum recommended stress of the best rods now available.

A.P.I. Standards 11-4, August 1941, states that the gear rating required of a unit shall be either four-tenths of the maximum polished-rod load times one-half the stroke length; or the maximum polished-rod load minus the counterbalance, times one-half the stroke length; whichever is larger. By this criterion the above unit requires a gear box rating of only 754,000 in-lb. to stress a 1-in. rod to 40,000 psi. As the gear box rating exceeds this figure it is apparent that it has ample strength to develop full performance from 1 in. or smaller rods.

A large hydraulically operated pumping unit is rated at 35,000 lb. maximum polished-rod load and is capable of a 240-in. stroke. It cannot be considered a general-purpose unit, as its maximum speed is only about 7 s.p.m., and it is satisfactory at that speed only if the minimum and maximum polished-rod loads are reasonably close and the horsepower requirements, therefore, not extreme. In deep pumping, where the major part of the load is rod weight, this condition is met: 7 s.p.m. is a satisfactory speed; and the unit is capable of stressing rods to over 40,000 psi.

Present-day units, therefore, are capable of stressing rods to more than their operating strength. Consequently, they are not a major limitation on the amount of fluid that can be pumped.

Pumps

It is believed that the depth at which a pump can operate is limited

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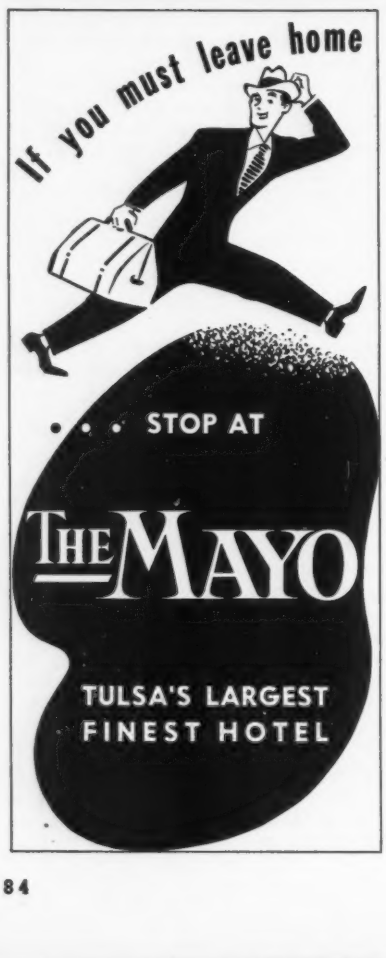
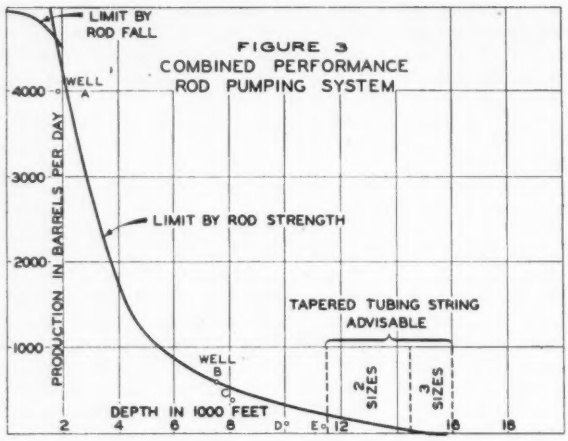




by the working strength of the smallest cross-section of steel between the rods and the plunger. In a 1¼-in. plunger pump this smallest cross-section is .27 sq. in. If it were pumping water from 16,000 ft. the fluid load on the plunger would be about 5,850 lb. and the stress in the critical section would be about 21,600 psi. This is well within the endurance limit of this quality steel, hence the pump, as far as is known, should operate satisfactorily.

Combined Performance

The curve in Fig. 3, which is composed of parts of the curves of Figs. 1 and 2, illustrates what may be considered the maximum amount of fluid that can be pumped from any depth. The curve is based upon the preceding assumptions and computations. Rod fall is the limiting factor above 1,700 ft.; rod strength is the limiting factor below that depth.

Also plotted on Fig. 3 are examples of actual production rates attained by rod pumping. All of the wells, with the possible exception of well A, were believed pumped down at the given production rates. Pertinent production information on the pumping installations follows as Table 1.

Conclusions

The speed with which rods and plunger will fall limits production from depths less than about 1,700 ft.

The operating strength of sucker rods is the primary limiting factor on production from depths over 1,700 ft. Tubing, pumping units, and pumps appear sufficiently strong to permit full utilization of working strength of rods.

The development of 40,000-psi.-working-strength rods, which now seems assured, has more than doubled the productive capacity of the rod pumping system from depths below 9,000 ft., and has lowered the limiting depth of rod type equipment to approximately 15,000 ft.

References

1. Throughout this paper, plunger overtravel and rod stretch were computed from the following formulas:

Overtravel in inches

$$= 1.55\ L^2 \times SN^2/70{,}500$$

where

L = Depth in 1,000 ft.
S = Polished-rod stroke in inches
N = Number of strokes per minute.

Rod stretch in inches

$$= .0001793\ Ap\ L\left(\frac{L_1}{Ar_1} + \frac{L_2}{Ar_2} + \frac{L_3}{Ar_3}\right)$$

where

L = Depth in 1,000 ft.
Ap = Area of plunger in square inches
L_1, L_2, L_3 = Length in feet of rods having areas of Ar_1, Ar_2, Ar_3, square inches respectively.

These formulas were taken from "Instructions for Using the Axelson Slide Rule" published by Axelson Manufacturing Co.

2. **The Mills formula,** presented in Production Bulletin 230, A.P.I., 1943, pg. 442, is:

$$Wmax = Wo + Wr\left(\frac{1 + SN^2}{70{,}500}\right)$$

where

Wmax = Maximum polished-rod load, in pounds.
Wo = Fluid weight on net plunger area, in pounds. Fluid assumed to have weight of water.
Wr = Weight of rods in air, in pounds.

S = Polished-rod stroke in inches.
N = Number of strokes per minute.

3. J. C. Slonnegar in "Drilling and Production Practice," A.P.I., 1937, pg. 179, showed that reflected and imposed loads are in phase when 237,000, divided by the product of the length of the rod string in feet and the number of strokes per minute, is a whole number.

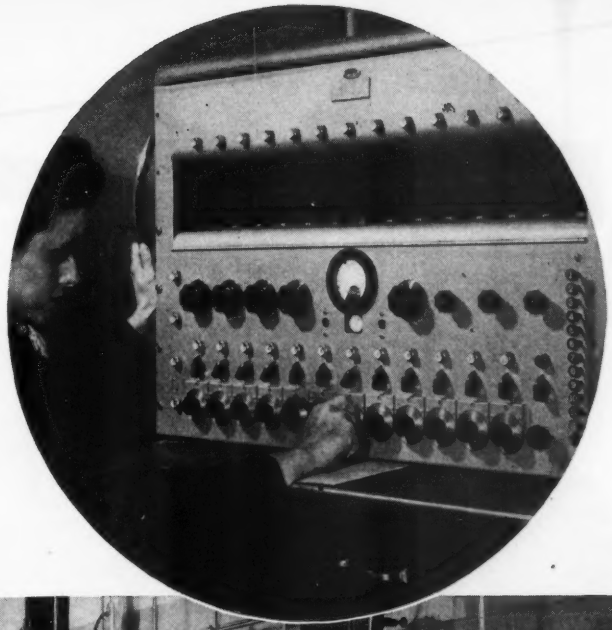
4. The strength and weight data on tubing was obtained from Supplement 3, July 1947, to Third Edition of A.P.I. code 5-O-2.

TABLE 1—EXAMPLES OF ACTUAL PRODUCTION

Well No.	Field (Calif.)—	Plunger size (in.)	Shoe depth (ft.)	Speed (s.p.m.)	Stroke (in.)	Prod. (B/D)
A	Gato Ridge	5¾	1,780	18	102	4,000
B	Santa Fe Springs	2	7,420	7.6	180	600
C	Kettleman Hills	2¼	8,067	5	240	400
D	Buena Park	1¼	10,002	11.6	102	135
E	Greeley	1¼	11,341	4.5	240	95

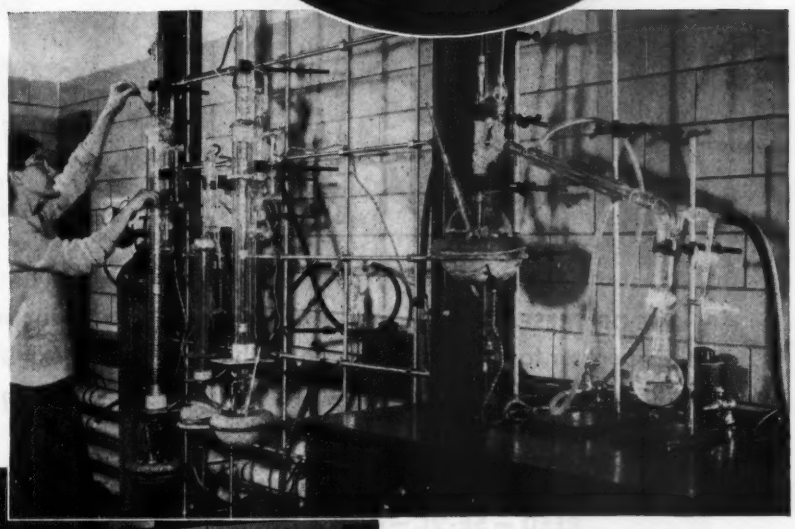
Chemistry-Physics Laboratory

Opened by Socony-Vacuum Oil Co. at Paulsboro, N. J.



OPEN house for its new chemistry-physics laboratory at Paulsboro, N. J., recently was held by Socony-Vacuum Oil Co., Inc. This new research plant contains 49,000 sq. ft. of laboratory space and is one of the most up to date of its kind. It assembles work quarters and equipment for 120 chemists and 45 physicists.

The new building includes the most modern analytical apparatus, housed in different rooms where humidity and temperatures may be controlled within narrow limits, at will. The general construction of the laboratory is reinforced concrete, with continuous window bands and brick facings. Office walls are plaster with asphalt-tile floors; laboratories use glazed tile and quarry tile on walls and floor respectively. Three stills provide necessary distilled water.



Circle: Control board for an electronic computer in the new chemistry and physics building of Socony-Vacuum, which is used in the working out of intricate mathematical problems. It can handle 12 problems simultaneously

Above: Distillation columns in a typical laboratory in Socony's new chemistry and physics building

Left: Mass spectrograph in the new chemistry and physics building. The machine analyzes mixtures of petroleum gases on the same principle as the centrifugal cream separator—by swirling the particles and catching the heavier ones on the outside of the circular path while the lighter ones are detected on the inside of the path. The swirling in this case is done by powerful electromagnets

Two 300-ton refrigeration units, with three smaller machines, supply the 700 tons of refrigeration needed for the entire laboratory. The window areas are heated by "continuous perimeter" hot-water radiators, controlled by outside thermostats.

Special provisions in the laboratory include the following important items in addition to those mentioned above. A central basement system supplies oxygen and nitrogen to the various laboratories.

The infrared analytical laboratory is housed in a room provided with air conditioning which holds the temperature within 1° of the point desired, and maintains relative humidity at any value down to 25 per cent.

Two cold rooms with separate units permit maintenance of temperatures as low as 20° F.

A glass-blowing room for four workmen is available for making special equipment required in the laboratories.

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DRILL OUT INSTRUCTIONS WITH REED — SE-2C — 6¼"

1. Initial bit weight should approximate 1500# to 2500# while drilling the first five inches of plug. Rotary speed should be about 50 r. p. m.

2. After five inches of penetration, which should require about 5 to 10 minutes, increase the Rotary speed and bit weight as follows:

   Reed—SE-2C (6¼") 15,000# 60 r.p.m.

3. Continue this weight and speed following the plug as it moves down the hole. Generally speaking the plug drills as follows, with a new bit:

   1st 6 inches — fast
   2nd 6 inches — fast
   3rd 6 inches — medium fast
   4th 6 inches — fast
   5th 6 inches — slow

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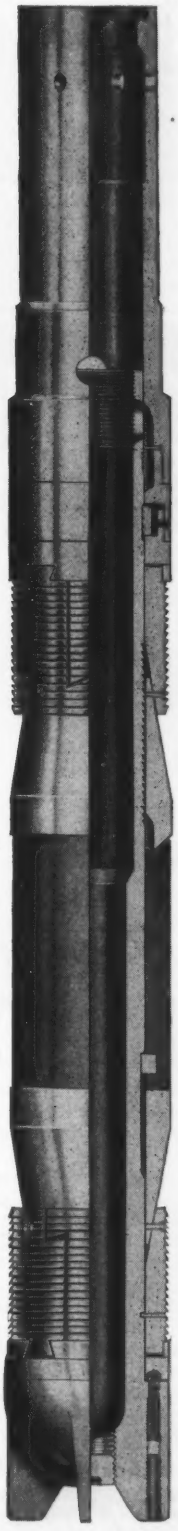

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lease windows are used for solvent storage.

Three large conference rooms are provided with slide and motion-picture projection facilities and with microphones and amplifiers.

A large machine shop, fully equipped, is located in the basement.

Piping used in the building amounts to 78,000 ft., or more than 15 miles.

Transite ducts 12 in. in diameter are used to conduct air and fumes from the 122 fume hoods, each with individual blower.

Fifty outside telephones and 100 interoffice phones are provided.

A new electron microscope which is capable of 100,000 diameters magnification is installed. An X-ray camera for photographing metals and other solids is also available. An emission spectrograph is used for detection of metal particles in solid fragments of macroscopic size. A mass spectrometer-spectrograph, now widely used in the oil and other industries, is installed under carefully controlled conditions for the analysis of complicated mixtures of hydrocarbon vapors.

The greatly expanded library contains more than 7,000 technical books in practically all scientific fields. It is in a section of the building which with the main lobby division, is 51 ft. wide and 65 ft. deep. It has facilities for 50 persons to work at once. The library subscribes to more than 200 scientific and technical journals, and is served by a staff of 11 persons.

Two sizes of laboratory rooms are provided in the unit; the larger rooms are 19 by 20 ft., and are intended for the use of two or three workers simultaneously. The smaller type rooms are 10 by 20 ft. and are to house only one or two operators. Small office and equipment rooms are connected with the larger laboratory units.

For easy and quick access to the various service lines of water, steam, etc., serving the laboratories, doors are installed in the walls of the hallway outside the units, and when changes are required in the service lines to one laboratory the other laboratories may continue work without interruption. Three million gallons of water per day are circulated through 12 water lines: distilled water is supplied for drinking and for various laboratory uses, transmitted via aluminum pipes, fittings, and valves. Each laboratory unit has its own exhaust system, with suction applied by a motor blower driving air and fumes to the outside via ducts leading to the roof. More than 125 motor units are required for this purpose. No air is circulated in the laboratories, all air exhausting from them to the outside; the office section has air recirculation.

Research Achievements at Paulsboro Laboratory

Among the outstanding research developments in the Paulsboro laboratories in the recent past are, for example, the discovery and development to commercial proportions of the lubricating-oil pour depressant, Santopour, now manufactured by Monsanto Chemical Co.

Organic nitriles are important chemical intermediates which were laboratory curiosities too expensive for commercial use until their large-scale manufacture was developed at Paulsboro. Plans are under way to build a new unit at Paulsboro to make these products, such as benzonitrile, important in pharmaceutical and dye and plastics fields, in commercial quantities.

Development of the well-known Thermofor catalytic cracking process, and the bead catalyst used widely in that process, was carried out principally at Paulsboro. Development work on jet fuels is going forward and one feature is the installation of equipment which simulates a jet engine and operable under conditions equipment to those at 60,000 ft. altitude. Sovabeads, a modified form of the material in the bead cracking catalyst, used as a highly efficient desiccant for keeping materials dry and undamaged by moisture, have been developed in this laboratory.

8 ACRES OF WATER FREE FROM ALGAE AND SLIME!

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TOP PHOTO—*The eight-acre cooling pond of the Dallas Power & Light Company. In center background is the huge plant which helps furnish electric power for a half million people.*

LOWER PHOTO—*A. D. P. & L. plant engineer adjusts the control valve of the Paddock High-Capacity Chlorinator which serves the big cooling pond.*

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Figure ST-1500
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Installation and Performance of Scale Traps in Sour-Crude Service

by George L. Crain*

THE first of eight fields were discovered in South Arkansas in 1939, from which sour crudes and distillates were to be produced. Interstate Oil Pipe Line Co. (at that time Standard Oil Co. of Louisiana, Pipe Line Department) began to install an extensive gathering and trunk-line system in the area.

By the end of 1945, when the last of these fields was brought in, Interstate had installed 175 miles of gathering lines and 50 high-speed pumping units, as well as a 30,000-bbl.-per-day main-line station at Magnolia, Ark., and 15½ miles of 8-in. trunk line which tied into its existing system at Haynesville, La.

*Interstate Oil Pipeline Co. Paper delivered at International Petroleum Congress and N.A.C.E. meeting, May 20, Tulsa, in connection with the 1948 International Petroleum Exposition.

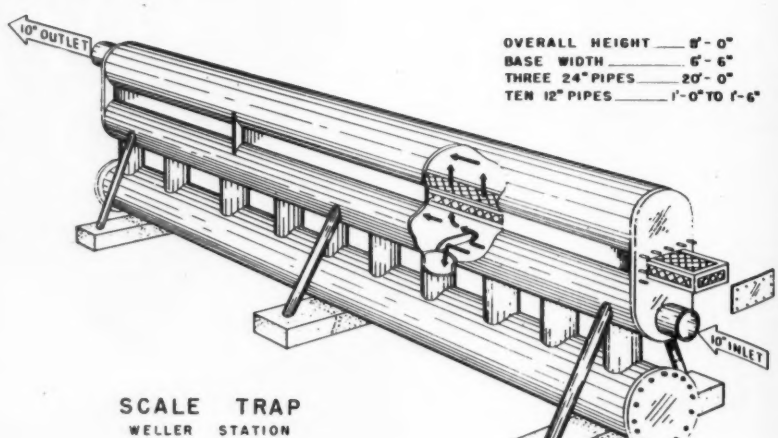


Fig. 1

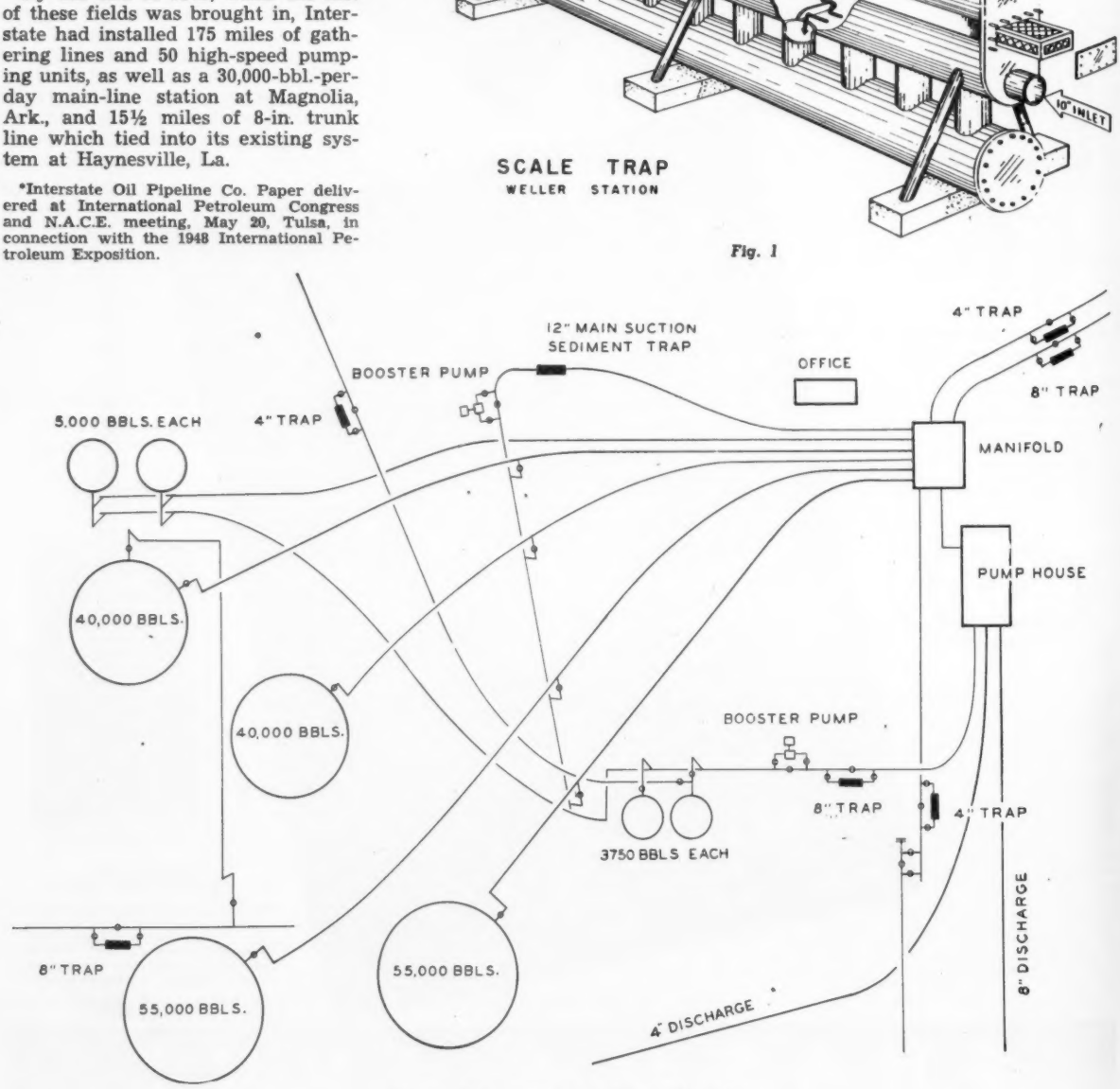


Fig. 2—Sediment-trap installation, Magnolia

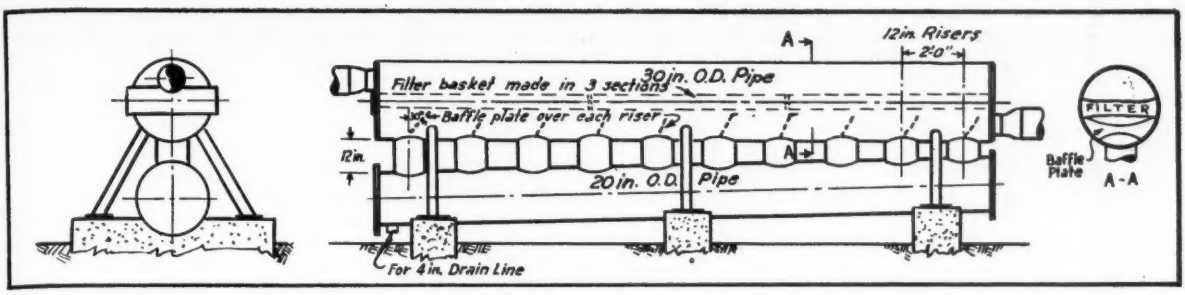


Fig. 3—Single-barrel sediment trap

After experiencing a series of leaks and increased maintenance costs of pumps and tanks in the fall of 1944, resulting from handling sour crude in the pipe-line system from Magnolia to Moore station, a survey was conducted to determine what procedures could be adopted to reduce this type of corrosion. The composition of the deposits found in the pipe lines consisted primarily of iron sulfide, iron oxide, inert material and water. The scale found on the roofs and bottoms of storage tanks was found to be iron sulfide with smaller quantities of iron oxide and free sulfur. Since iron sulfide is cathodic to iron in presence of H_2S dissolved in brine, ideal conditions for hydrogen sulfide corrosion existed throughout this system.

In order to eliminate, as much as possible, the formation of scale in the trunk-line system, an extensive scraper program was begun which moved the scale and brine from the lines into the tanks. However, when these tanks were pumped as low as possible, large quantities of the scale were picked up and passed through the pumps back into the line. Repairs to the pumps continued to increase at such a rate that it was decided to install a scale trap at Weller station between the tanks and pump manifold. This station was chosen due to the large number of costly repairs being made to the pumps.

The mechanical department designed a trap to meet the requirements of handling 40,000 bbl. of crude per day. A sketch of this trap is shown in Fig. 1. This trap was installed and placed in operation June 28, 1946. The cost of material and installation was approximately $3,000. Immediately the repairs to the pumps at Weller station dropped and approached those for sweet-crude operations.

It is of interest to note that from January 1 to June 28, 1946, 25 plungers were replaced at a cost of $2,300 and for the remainder of the year no replacements were required. Since the installation of this trap to January 1, 1948, seven plungers have been replaced, and indications are that plunger replacements will become stabilized at this figure.

Tests were conducted as to the best filter media to use. Rock wool, fiber glass, jute and cotton bagging, cotton waste, and rags were either tried individually or in combinations. It has been concluded that the most efficient and economical media to date consists of six to eight layers of jute bagging with a 1-in. layer of cotton waste. All heavy materials and an estimated 60 per cent of finely divided materials are separated within the trap. Eighteen thousand pounds of scale and 150 bbl. of brine have been removed thus far by this trap.

Because of the good results that were being obtained from the installation at Weller station, the company decided to install similar traps at Magnolia station on both incoming lines from the various fields and station suction lines. This installation was completed in May 1947, at a cost of $17,460. A sketch of the sediment trap installation at Magnolia station is shown in Fig. 2.

Traps for Magnolia station were redesigned and improved, as illustrated in Fig. 3. This design has become standardized and will be used in all future installations.

On the main suction line a 30-in. diameter single-barrel trap was installed, capable of handling an excess of 30,000 bbl. per day. Due to the small difference in elevation of several tank bottoms and the station manifold, a low-pressure high-volume centrifugal pump was installed to boost the crude through the trap. The cost of this installation was $5,925. Normally, the pressure drop through the trap will vary from 1½ to 3 psi., depending upon the compactness of the filter media. A picture of this scale trap is shown in Fig. 4.

On the filling lines into Magnolia station the capacity of the traps required was much less than that previously mentioned. Here single-barrel traps similar in design to the one mentioned above, but smaller in capacity, were installed. These five traps cost approximately $7,480 to construct and install.

To date, these traps have removed 8,500 lb. of scale and paraffin from the crude which is handled through Magnolia station. All the scale which is removed in the traps on the suc-

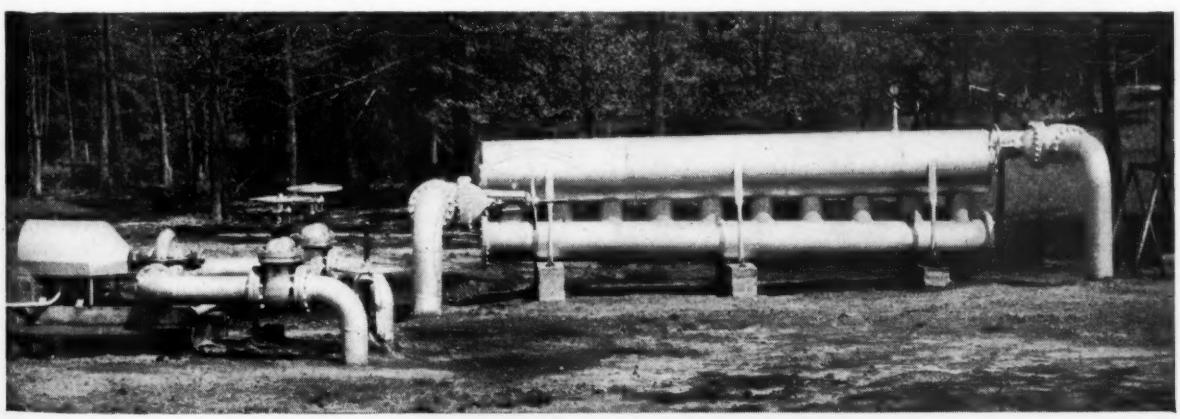


Fig. 4—Scale trap on main suction line

tion lines here comes from the tanks and the station piping.

At Moore station, three large traps similar to the one at Magnolia station, but larger in size due to the volume of crude to be handled, have been installed on the main suction lines. All these units are equipped with 50,000-bbl.-per-day booster pumps and bypassing arrangements to allow the maximum flexibility in operations. These units were only recently placed in service and no data are available as to their performance. The complete cost of this installation was $29,604.

As each of the above stations operates at capacity each day, the elimination of down time is essential. Therefore, each trap is equipped with a bypassing arrangement which is used during time of cleaning or repairs. On large traps the cleaning interval varies from 4 to 6 weeks, provided the pressure drop does not become excessive, whereas on the smaller ones this interval may run as high as 8 to 10 weeks.

In addition to mechanical improvements of, the design of these traps, several operational improvements have also been made. One of the most important ones has been the elimination of vibration within the trap due to surges resulting from large reciprocating pumps. This has been accomplished by installing surge chambers between the trap and the pump manifold.

For determining pressure drops across the filter media, only one gage is used. This allows the pressure drop to be determined accurately since all possibility of error in gage calibration is canceled.

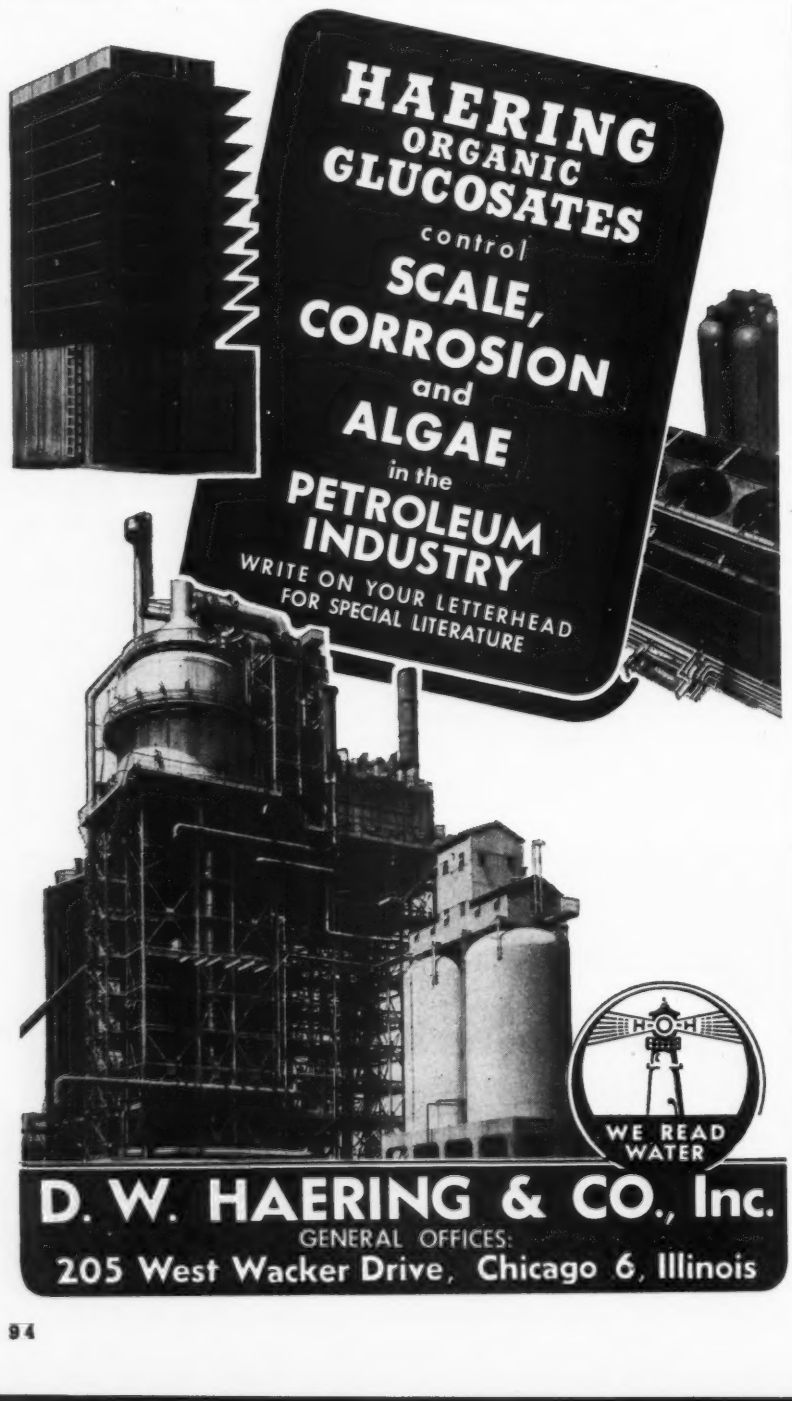
Lids for the wire baskets which hold the filter media originally were bolted down. After several weeks of operation, these bolts became tightened and considerable effort and time were necessary to remove these lids. This has been modified and now the lids are slid in place and the time for removal reduced to a minimum.

Although we have made considerable advance in design and operation of our traps there are still several items pertaining to them which we are continuously attempting to improve. The baskets which hold the filter media are made of 2-in. angle iron, and ¾-in. mesh 12-gage wire. In sour crude the service life is only 2 to 3 months.

We are planning to install an aluminum basket and are also studying the possibility of using protective coatings over iron mesh—possibly one or the other will be satisfactory. Our efforts to obtain new materials for filter media are continuing as well as an improved method for evaluating them.

Since these fields in South Arkansas were discovered, the majority of the Interstate's Southern Division pipe-line system has become affected with internal corrosion. As mentioned previously, the most affected area lies between Magnolia and Moore stations, but as various blends of sour crude are pumped both north and south from Moore station, this system has also become affected. Due to the delivery requirements, 1,043 miles of trunk line varying in size from 8 to 12 in., 52 large storage tanks, 11 trunk-line stations and gathering systems in eight sour-crude fields, have become exposed to sour crude. The cost of repairs due to internal corrosion in this system has been excessive during the past years, and the costs are increasing annually.

Interstate will soon have 12 scale traps operating in the sour-crude system from Magnolia to Shreveport. By removing the scale which is formed in the lease tanks and gathering systems of the sour-crude fields at Magnolia station, and eliminating the scale formed in storage tanks at each station, not only are we protecting the pipe-line facilities but are eliminating one of the main contributors to hydrogen sulfide corrosion. Although it is difficult to evaluate the benefits being derived from the installation of scale traps other than a reduction in pump maintenance, we believe that these traps are a good investment and plan to install them whenever conditions warrant.



Drill-Pipe Failures, Inspection, and Protection in the Permian Basin

by W. H. Crenshaw, V. B. Bottoms,† C. N. Wallace,‡ and C. R. O'Dell¶*

THIS paper discusses from a progress standpoint some of the steps taken by drilling operators in the Permian basin during the past 2 years towards reducing drill-pipe failures. The article is from the presentation at the 1948 spring meeting of the Southwestern A.P.I. District held at San Antonio.

THERE has been a considerable reduction in service failures from all causes during the past 2 years in the West Texas-New Mexico area. This reduction may be attributed to better operating techniques developed by the independent and group research of the contractors, mills, and independent research organizations. A brief discussion of each of these techniques follows:

1. **Use of drill collars.**—Two years ago most contractors were using only a small number of drill collars. Today, it is an almost universal practice to employ long strings of collars to keep the pipe string in tension. This lowers bending stresses in the pipe, eliminates column distortion caused by compression load, and adds greatly to the service life of the pipe.

2. **Use of salt string.**—Many contractors today, after drilling through the salt zone, use a separate string of drill pipe, which has never been drilled in salt, to complete the hard-rock drilling in fresh-water muds. Usually, the string which has never drilled in salt is picked up after the salt zone has been cased off. To prevent salt contamination, the mud tanks are flushed thoroughly and new fresh water mud is made up. Although this practice is not as universal as that of using long strings of drill collars, it has been used widely enough to offer conclusive evidence of its effectiveness. An increasing number of contractors are adopting the procedure each day. Two years ago, the technique was almost unheard of, although a few had tried it experimentally.

3. **Reduced speed of rotation.**—It has been observed also that practically all drilling operators have reduced the speeds of rotation, particularly in the hard-rock areas. Operating stresses are thereby reduced to much safer levels with a resultant decrease in failure expectancy.

4. **Use of smaller-diameter pipe.**—There is also a trend toward the use of smaller-diameter drill pipe as drilling depths increase. Observed results of this practice have been good, although it is not uniformly employed at this time. The object of this technique is to provide a more flexible drill string to absorb the increased loads.

5. **Use of field inspection.**—An im-

*American Inspection Service, †Superior Oil Co., and ‡Western Plastic Co., Inc., Midland, Tex.; ¶Tuboscope Co., Odessa, Tex.

Summary of Types of Failures and Causes

1. ABRASIVE WEAR (UNDER GAGE)

Occurs: Most frequently in the center of the joint over an area of approximately 8 ft.

Cause: Running of crooked pipe, and running pipe in severe compression causing severe bending reversals with resultant whipping in the hole.

2. FATIGUE FAILURE

Occurs: In the lighter drilling areas, the cracks occur within 4 or 5 ft. of the end of the joint. In the hard-rock drilling areas, primarily West Texas and New Mexico, the cracks were found to occur at any area along the entire length of the pipe.

Cause: Fatigue defects are classed as those occurring during the service life to which the pipe is subjected, and are divided into three groups:

(a) Those occurring from pure fatigue, i.e., where the joint has exceeded the stress load for which it was designed.

(b) Those cracks occurring from notch fatigue, wherein the crack develops in less than the maximum number of stress reversals for which the pipe was designed, from one or more notches in the surface of the metal. Notches concentrate the stresses of operation at the base of the notch, and greatly reduce the number of stress reversals available before the commencement of failure.

(c) Those cracks resulting from corrosion fatigue, wherein the notch effect created in the bottom of minute corrosive pits caused by electrolytic action, concentrates the stresses of operation at the base of the notch, and reduces the maximum number of stress reversals available before commencement of failure.

3. MILL DEFECTS

Occur: At any point along the length of the pipe.

Cause: Laps, seams, inclusions, upsetting discontinuities, and die and reamer marks.

4. HANDLING DEFECTS

Occur: Over entire length of joint on outside surface, i.e., with relation to scars and gouges. Slip cuts and tong mashes occur within a 6-ft. length from the ends of the joint. Elongation generally at the upset runout and in severe cases along the length of the joint.

Cause: Worn tools, careless and rough handling, and pulling stuck pipe to free it.

5. INTERNAL DEFECTS

Occur: Throughout the entire length of the joint.

Cause: Internal corrosive pitting, and mill defects consisting of laps, seams, inclusions, upsetting discontinuities, and die and reamer marks.

6. BOX AND PIN DEFECTS

Occur: Either in the threaded section or in the body of the tool joint proper.

Cause: Improper makeup, careless handling, faulty manufacturing, or improper installation.

portant factor in the reduction of drill-pipe failures during service has been the increased use of improved field inspection services for the detection of fatigue cracks, corrosive pitting, and points of stress concentration which may lead to failure. The principal object of inspection is to detect and thereby facilitate the removal from the active drilling string of incipient breaks. In this manner, failures are prevented from occurring in the hole. The subject of field inspection is given further detailed discussion later in the paper.

6. **Use of protection methods.** — A number of methods of protecting drill pipe have been used in the field. The most successful methods thus far tried have been shot peening, use of chemical inhibitors, and use of plastic coatings. These three protection methods are discussed in detail later in the paper.

Although a very great deal has been written concerning the effect of changes in rig operation techniques and equipment on the reduction in number of in-the-hole failures of drill pipe, very little information has been advanced on field inspection and on protection methods. In view of this fact, this paper treats in detail these two very important methods now being employed in the Permian basin in an effort to further reduce drill-pipe failures.

Drill Pipe Inspection

General.—A large majority of the operators are now periodically employing inspection on their strings and weeding out defective joints. The interval between inspections is variable and is based on the operating experience of the individual drilling contractor. Some operators determine the necessity for inspection on the basis of washouts and cracks located by their crews on trips in and out of the hole, while others base the need on actual failures in the hole causing fishing jobs. Both situations actually are failures, and are considered as such by the inspection services for the purpose of recording results of inspections. The average time between inspections is every second to third well, or after drilling 18,000 to 30,000 ft. of hole.

Magnetic - particle method. — With the advent of the magnetic-particle method, external inspection has been more greatly improved than any other phase of the entire inspection operation. The method, widely used for over 15 years in many industries, was applied to drill-pipe work approximately 3½ years ago. A controlled magnetic field is introduced into the pipe, usually in a longitudinal direction, by means of a coil carrying a low-voltage, high-amperage current. As the magnetic field flows along the pipe, transverse defects such as fatigue cracks, mill laps, seams, and inclusions offer a reluctance to its passage, resulting in some of the field pushing out into the external air at the defect. A north-side pole is set up on either side of the defect, creating simply the effect of a horseshoe magnet. A finely divided steel power, especially selected for its magnetic characteristics, is applied to the surface area being inspected. When these particles come in contact with the external field set up by a defect, they are attracted thereto and align themselves in a pattern along the extent of the defect, clearly outlining it. In other words, the powder particles, having some degree of length and breadth, serve as the "bar" which is placed across the horseshoe magnet.

At present, the magnetic-particle method appears to be the only method employed by the various inspection services which removes most of the "human" element in its application. Table 1 shows the average percentages of defects found by the inspection services during recent years. It is believed that the majority of these defects could not have been located by visual inspection alone. Battelle Memorial Institute has been conducting research for over a year in an effort to develop a better method for nondestructive testing of drill pipe. A recent progress report indicated that approximately 300 patented methods had been investigated and results revealed that none of these methods offered any improvement over the magnetic - particle method now employed.

TABLE 1—DEFECT PERCENTAGE OCCURRING IN TOTAL AMOUNT OF PIPE INSPECTED

Classes of defects—	1946-47	1945
Under gage	4.0	18.0
Fatigue defects	*6.0	*4.0
Mill defects	*4.0	*0.2
Handling defects	*2.5	*2.5
Internal defects	6.0	2.5
Tool joint defects	*3.5	*7.5
Recapitulation		
Total per cent of rejectable defects	22.5	26.5
Total per cent of repairable or replaceable defects	3.5	7.5
Total per cent of good pipe	74.0	65.99

*Defects normally located by use of magnetic partical inspection.

These figures based on a weighted average of field inspection data obtained from two major inspection companies operating in the West Texas-New Mexico Permian basin area.

Internal inspection method. — Internal inspection of drill pipe is still accomplished by means of an optical instrument for viewing the internal wall of the pipe, lighted by a mercury-vapor light mounted in the head of the instrument. The disadvantages of this method of inspection lie in operator fatigue, optical limitations of the instrument, and inability of the instrument to reveal to the operator minute and tight-lipped cracks. However, its effectiveness has been enhanced greatly by better internal cleaning methods developed and adopted during the past 2 years.

Sandblasting of the internal surface and the use of an acid bath followed by wire brushing to remove loosened scale deposits have brought marked improvement to internal inspection and result in complete cleansing of the internal surface. All mill scale, which not only hampers the inspector, but reduces the service life of the pipe in corrosive fluids, is removed by these two methods of cleaning. Laboratory tests and field observation show that removal of scale retards the corrosive action, and promotes longer service life. (Ref. Battelle Memorial Institute Report No. 7 to A. A. O. D. C., February 15, 1947.)

The combination of the magnetic-particle method externally and better cleaning internally have led to better interpretation of the findings of the inspector, resulting in a lower margin of error, and consequently a lowered failure rate between inspections.

Inspection personnel. — The standard of inspection personnel has improved in the past 2 years, with the return of many men from the armed services. The training of good drill pipe inspectors is a slow and laborious process. To be a good safe inspector, one should have a basic understanding of metallurgy and of stress conditions under which drill pipe operates. He should have a knowledge of fatigue and its effects on drill pipe; and he must thoroughly understand his processes of inspection. The training period should include study and lecture courses in addition to field experience under fully trained and experienced inspectors. Programs of inspector education along these lines are being followed by most of the various inspection services.

Standards of rejection.—The standard of rejection is followed uniformly by the inspection services using the above-mentioned processes. Several inspection processes, which are being tried at this time or have been tried in the past 2 years, involving electronic or radiographic principles, follow somewhat varying and different standards of rejection. It has been impossible, however, to arrive at any conclusive set of standards for some processes.

1. **New pipe.**—One of the most controversial questions which has arisen in the past few years is that of the standards to be followed in the rejection of mill defects in new pipe. The mills have taken the position that mill defects are not harmful unless they extend more than 12½ per cent of the wall thickness. This tolerance is allowed by the A.P.I. code. The inspection services have taken the position that such defects could be harmful regardless of depth, unless they can be ground out without setting up a further notch condi-

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tion or materially affecting the wall thickness.

The mills generally contend that no failure has been traced directly to a mill defect. On the other hand, the inspection services have traced numerous failures directly to mill defects.

It is possible that the tolerances allowed by the A.P.I. code are too liberal since this code was established before present severe drilling loads were encountered. It is expected that additional information regarding the effect of mill defects on the service life of drill pipe will be obtained from several strings now drilling which are made up of pipe containing known mill defects.

2. **Used pipe.**—Rejection standards on used pipe are fairly uniform and are agreed upon by the inspection services. Fatigue cracks on external surfaces are rejected unless they can be ground out without creating a further notch condition or materially affecting the wall thickness. External abrasive wall wear in excess of 20 per cent of the original wall thickness is the basis for rejection of pipe used for deep drilling.

Quite often rejected pipe is used in shallow-drilling areas and obtains good footage. Pipe containing external discontinuities such as slip cuts, tong mashes, deep scars and gouges, pitting, and mill defects is rejected on the basis of depth, size, direction, and location on the pipe. Transverse discontinuities are more quickly rejected than longitudinal discontinuities. Pipe containing internal pitting is rejected on a basis of pit depth and concentration. Pipe containing internal mill defects is rejected on the basis of size, depth, location and direction of the defect. In the over-all consideration of whether a defect or discontinuity should be rejected, the conservative view must be taken by the inspector, since the object of inspection is to prevent failure of the pipe in the hole.

Of the two inspection services operating in the Permian basin, one follows the policy of grading the pipe it inspects by number, while the other does not grade the pipe it inspects, but classifies it as either "good" or "bad." Each of the two companies follows a color marking system for the identification of the pipe, according to its condition. This system is not uniform because of the difference in grading and nongrading policies. It seems advisable that a uniform system of color marking be adopted for the benefit of those using inspection service.

Inspection prices have increased approximately 25 per cent in 2 years as a result of the higher cost of greatly improved cleaning methods. The cost of complete external and internal inspection now averages, including mileage costs, approximately $0.16 per foot on strings which are racked at the time of inspection. In those instances where additional truck time is necessary to put up temporary racks and to place the pipe on those racks, a few cents per joint is added to the above cost.

Assuming 30,000 ft. as the average footage drilled between inspections by an 8,500-ft. string, the inspection cost per foot drilled is calculated at $0.045. It is readily seen therefore that the cost of inspection per foot drilled is a minor investment compared with the dollar savings obtained in the reduction of failures and increased string efficiency.

Drill-Pipe Protection

Use of chemical inhibitors.—Chemical inhibitors have been used in the drilling fluid to reduce the effects of corrosion. Many operators have found this practice to be helpful. However, some operators have obtained only slight benefits not compatible with the costs, while others have obtained no beneficial results. At this time, consensus seems to be that the benefits to be gained are not justified because of high cost, the difficulty in obtaining inhibitors in sufficient quantities, and the variability of results. Additional research and experience are considered necessary, however, before definite conclusions can be reached.

Use of shot-peened pipe.—A number of companies have employed drill strings which have been shot peened internally for the full length, and for an area of 24 to 30 in. below the tool joint externally. The effect of the shot peening is to case harden the surface of the pipe to a depth of 0.006 to 0.010 in., and to set up in this zone a compression stress. Inasmuch as any fatigue failure must occur from a tension stress, and a tension stress will not progress through a zone of compression stress, the possibility of failure from fatigue is greatly reduced.

Of course, once the compression zone has been penetrated by corrosive pitting or mechanical damage, its effect is lost at that area. However, it has been noted that corrosive pitting is greatly retarded over a shot-peened surface. One string was observed which had been in service for several months in a highly corrosive area; 98 per cent of the peened pipe showed no corrosive pitting and 2 per cent showed a slight amount of pitting, while pipe in the same string which had not been peened was excessively pitted and much of it was rejected on inspection. Other strings of shot-peened pipe have given very good service in this area.

About a year ago, approximately 40 tests were made by two companies to determine the effect on fatigue life of peening the external area of the drill pipe from a point just below the tool joint to below the upset runout. For this experiment, full-length points of both Grade D and Grade E pipe were subjected to rotating beam tests. The unpeened specimens failed at approximately 300,000 cycles while those which had been peened operated some 6,000,000 cycles before failure. Some additional operating life was obtained on the Grade E over the Grade D.

Within the past 2 months additional tests were made employing three joints of Grade E pipe unpeened, and three joints of Grade E pipe peened, full-length specimens. Again the unpeened pipe failed at 300,000 cycles and the peened pipe at 6,000,000 cycles. Under laboratory conditions, these tests set up a fatigue ratio of 20 to 1 of peened pipe over unpeened pipe. Based on these experiments, it seems safe to conclude that shot peening may be expected to add further to the service life of the pipe.

It may be desirable to protect the peened area with a plastic coating further to preserve its effectiveness from abrasive wear. One test in the field of this type showed that the coating would stay on for a considerable length of time. For this test only one finish coat was applied, with the idea of preventing the area from rusting while in storage. It seems reasonable to conclude that by following the regular coating procedure still better results may be had.

Use of plastic coating.—(1) Types of coatings: This paper deals only with plastic coating; no attempt is made to evaluate any other type of protective coating.

There are two types of plastics in use today as a protective coating. They are phenolic base and vinyl acetate base. There are three methods of applying the phenolic and one method of applying the vinyl. The phenolic is sprayed on and air dried, sprayed on and baked, or dipped and baked. Then vinyl is applied only by spray and is air dried.

Some of the physical properties of the phenolic thermosetting are:

1. Oil resistant.
2. Chemically inert except to hot concentrated alkali.
3. Resistant to cold alkali in solutions of 0.3 normal.
4. Resistant to heat up to 400° F.
5. Abrasion resistant.
6. Chip resistant.
7. Has a hardness of 35 to 40 Brinell.
8. Has sufficient flexibility to bend on sheet metal round a 5-in. mandrel without cracking.

Some of the physical properties of the vinyl are:

1. Oil resistant.
2. Chemically inert except to concentrated nitric acid, glacial acetic acid, and carbon tetrachloride.
3. Abrasive resistant.
4. Is not affected by bending, flexing, contracting or expanding.
5. Is not affected by temperatures from below freezing to 160° F.
6. Is not brittle and will withstand reasonable impact.
7. Has a stretch quality of from 180 per cent to 200 per cent.

Method of coating.—Cleaning: In the application of a protective coating, the most important factor is the bond obtained between the metal and the coating. The condition of the surface to be coated is of prime importance, as a clean surface permits a better bond than one covered by foreign material. At present, the most common method is to blast the surface with an abrasive material.

Sand is the most commonly used abrasive. Steel grit and crushed flint also are used. Acid etch is employed to clean used pipe before inspection and before blasting, but, to the author's knowledge, has not been used to date in the preparation of drill pipe for protective coating.

Some operators feel that shot peening is of definite benefit to the drill pipe. This usually is done in connection with protective coating. After the surface has been cleaned, it is peened before the coating is applied.

Application of plastic.—The method of application of the phenolic air dried and the vinyl air dried is the same. The surface to be coated is cleaned thoroughly. Two coats of primer are applied by spray. The primer is of the same plastic as the finish coat, with special adhesive properties. Four coats of finish plastic are then applied by spray, allowing sufficient time between coats for the previous one to dry thoroughly.

The first field test of the phenolic air-dried plastic was made in 1942*. We quote from Spang's report of May 1947 concerning the serviceability of this coating.

"Although 25,000 ft. of drilling showed considerable gain in the life of the pipe, the coating did not stand up as well as expected. Large patches had been removed, possible by the erosive action of the mud, and possibly by some corrosive action, because the pipe surface was found to be pitted and corroded."

There are two methods of applying the phenolic thermosetting. The surface is cleaned thoroughly, in each case, by grit blasting. One method is to place the joints in a vertical position and fill them with liquid plastic by pumping it through a connection on the bottom of the bottom of each joint. The plastic is then drained out at a controlled rate. Controlling the rate of draining gives some measure of control of the thickness of each layer of plastic. The pipe is set aside and allowed to dry by natural circulation of air after each coating. After four coats have been applied, it is baked in an oven at a temperature of 450° F. until thoroughly fused.

Another method of application of the thermosetting is by spraying on several successive coats until the desired thickness is obtained, then baking at a predetermined temperature. The final coat is baked at an elevated temperature to fuse and blend the several layers.

*Interim Bulletin—May 1947, by Spang-Chalfant Division of National Supply Co.

Analysis of field tests. — Several strings of internally plastic-coated drill pipe are in use at the present time in the Permian basin. One oil company now has three strings in service designated as strings Nos. 39, 32, and 36, and the results of the service tests on these strings are discussed in detail below.

(a) Drill string No. 39: One string (identified as No. 39) was put in service December 8, 1945. The string originally consisted of 282 joints, or 8,527 ft. of 4½ in. o.d., 20.30 lb., Grade E, Range 2, E.U.I.F. seamless. One hundred and forty-one joints, or 4,266 ft., were uncoated, 141 joints, or 4,261 ft., were phenolic thermosetting plastic coated. The coated and uncoated joints were placed alternately in the string.

At the end of 103 drilling days and 16,120 ft. of hole (in TXL field, Ector County, Texas), the pipe was inspected. One hundred and sixteen of the 141 joints of uncoated pipe were junked due to internal corrosion pits. Twenty-three joints were sent in to be coated. Three in service failures had occurred in the uncoated pipe; none had occurred in the coated pipe. Seven joints, or 213 ft. of coated pipe were junked—six due to external pits, one due to fatigue cracks. The uncoated pipe was replaced with 133 joints, or 4,031 ft. of the same weight and grade phenolic coated, making a total of 267 joints, or 8,079 ft. in the string.

After drilling an additional 157 days and 29,105 ft. of hole, the string again was inspected. Four joints, or 121 ft., were junked —three due to external cuts, and one due to external pits. No service failures had occurred during this period. Twenty-six joints, or 693 ft., were returned to warehouse stock, because they were not needed in the string. The string then contained 237 joints.

At the end of an additional 19 days and 3,334 ft. of hole, the string again was inspected. (It was noted that the plastic coating was being removed from some joints, and was felt that a thorough inspection of the coating should be made.) Nineteen joints were junked—15 had internal cracks, 4 had internal pitting. One hundred sixty-two joints were returned for recoating. Fifty-six joints of the string remained in service. How many of these 56 joints were in the original string is not known. The 26 joints that had been in stock were returned to service. Eighty-eight joints (25 of which were in the original 141 joints of uncoated pipe, and 63 new ones) of phenolic-coated pipe were returned to service. One hundred and sixty-two joints that previously were phenolic coated were vinyl coated and returned to service, making a total of 332 joints, in the string.

At the end of an additional 101 drilling days and 9,230 ft. of hole, the string was inspected. Of the 332 joints, none were junked. No service failures had occurred. Thirty-nine phenolic and 9 vinyl-coated joints were returned for recoating with vinyl plastic. Since the last inspection, there have been 64 drilling days, and 6,079 ft. of hole made. No service failures have occurred, and no pipe junked.

The results of the service test of Drill String No. 39 are summarized below:

String No. 39 has drilled 63,868 ft. of hole in 444 drilling days.

No service failures have occurred in coated pipe.

Three failures have occurred in uncoated pipe.

One hundred and sixteen joints of uncoated pipe were junked after drilling 16,120 ft. of hole.

Thirty joints of coated pipe were junked while drilling 63,868 ft. of hole—4 due to corrosion pits, and 26 due to fatigue cracks.

A total of 146 joints have been junked from the string from all causes.

A total of 116 new phenolic-coated joints were used as replacements.

Fifty new vinyl-coated joints were added.

The string has a total of 332 joints in it today.

(b) Drill string No. 32: Another string (identified as No. 32) consisted of 255 joints, or 11,244 ft. of 4½-in. o.d., 18.10-lb., Grade E, Range 3, seamless, phenolic thermosetting coated pipe. It had been in service 159 drilling days and had made 22,743 ft. of hole when first inspected. One joint was junked because of external pits. No service failures had occurred. It is still in service, but has been inspected only the one time.

(c) Drill string No. 36: Another string (identified as No. 36) consisted of 92 joints, or 4,131 ft. of 5 9/16-in. o.d. 25.20-lb., Grade D, Range 3, seamless, phenolic thermosetting coated pipe. It had been in service 104 drilling days and had made 22,223 ft. of hole when first inspected. Three joints were junked because of external wear. No service failures had occurred. Eighty-nine joints, or 3,999 ft., of pipe are still in the string. At the end of 146 drilling days and 33,388 ft. of hole, the pipe is still running with no service failures and no additional pipe has been junked.

Economics of plastic coating.—Very few data are available on the field performance of plastic-coated drill pipe. In view of this fact, this discussion of economics is based entirely upon the results of the field test of string No. 39, which is the most complete field test of plastic-coated pipe to date.

String No. 39 was received F.O.B. Midland, Tex., at $3.13 per foot, without cleaning or coating. Using the 4,266 ft. of uncoated pipe and the 16,120 ft. of hole as a basis, drilling with uncoated pipe cost 68.1 cents per foot for drill pipe. Assuming the life of string No. 39 is 66 per cent gone, depreciating it accordingly, and adding the actual cost of coating and recoating, plus the full value of junked pipe, it cost this operator 55.74 cents per foot for drill pipe to drill 63,868 ft. of hole using coated pipe. Had the 63,868 ft. of hole been drilled with uncoated pipe, on the basis of the 141 uncoated joints used in the beginning of this string, it would have been necessary to buy 3.96 additional strings of pipe. Nine fishing jobs also would have been necessitated.

If the results obtained with string No. 39 can be regarded as typical, the use of plastic-coated drill pipe has proved to be practical both from an operating and economic standpoint.

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TABLE 4—COMPARISON OF BEARING CORROSION INHIBITORS

INHIBITOR	LABORATORY TESTS					L 4 ENGINE TESTS				
	MODE OF ACTION				CORROSION LOSS AFTER 45 MIN. MG./SQ.CM.	ADDITIVE LOSS IN USE		CORROSION INHIBITION	OIL DETERIORATION	ENGINE CLEANLINESS
	REDUCTION OF PEROXIDE	ANTIOXIDANT ACTION	METAL DEACTIVATION	IMPERMEABLE FILM ON BEARING		%	Pb/Cu			
A	SLOW	FAIR	FAIR	GOOD	066	32	—	POOR	N.C.	N.C.
B	INTER-MEDIATE	GOOD	GOOD	GOOD	.140	29	—	GOOD	FAIR	N.C.
C	RAPID	GOOD	GOOD	FAIR-	3.019	34	—	FAIR+	GOOD	GOOD
D	RAPID	GOOD	GOOD	POOR	4.125	—	10	POOR	N.C.	N.C.
E	INTER-MEDIATE	FAIR	FAIR	POOR	2.270	—	30	FAIR-	N.C.	POOR

Inhibitor Action in Crankcase Lubricants

(Continued from page 73)

which tends to give fairly high bearing corrosion values was used in all of the test runs.

Bearing weight losses of over 1,500 mg. are simply reported as "failed."

From these engine tests it appears that inhibitor B was by far the most effective in inhibiting power, with inhibitor C a close second. Inhibitor C gave best results on engine cleanliness and on reduction of oil deterioration. Inhibitor B was fair in prevention of oil deterioration. Failure of some inhibitors to prevent bearing corrosion adequately may be due to the somewhat corrosive nature of the base oil and of the gasoline used. In the case of inhibitor A, the bearing coating formed in our laboratory tests appeared crystalline in nature, and acted as an effective corrosion barrier on the heavy test specimens. However, the thin-walled bearing employed in the Chevrolet test may permit sufficient distortion of the film to break it loose and thus permit corrosion to occur; also the abrasive and scouring actions in the actual bearing are probably much more severe than the laboratory corrosion test used.

Summary

1. General factors involved in the corrosion of copper-lead bearings are discussed.

2. A comparison of five types of bearing corrosion inhibitors used commercially for crankcase lubricants has been made from the standpoint of how they function as inhibitors and to determine other beneficial or detrimental actions they may cause.

Table 4 represents the conclusions from this work.

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A Subsurface Flow-rate Indicator

(Continued from page 76)

relation to the total interval while under a known set of conditions. The bar graphs at the right of each of these two examples show the loss percentage of the particular interval in relation to the total loss of fluid.

A permeability profile of any interval may be obtained by injection of any fluid as described above. A production profile of the interval may also be obtained by producing the well.

Future Developments

Work is being carried on toward the development of a smaller o.d. instrument for work in the annulus and through the tubing. In surveys made through the tubing it will be necessary to place the lower end of the tubing string above the interval to be surveyed. This is usually above the top of the perforated interval and will in some cases involve raising the tubing string. It will also be necessary to provide an open end on the tubing with sufficient clearance to pass the instrument. It is expected that the minimum i.d. through which the tool will pass with adequate safe clearance will be 2 in.

BOOKS

THE CHEMISTRY AND TECHNOLOGY OF WAXES. By Albin H. Warth; Reinhold Publishing Corp., 330 West 42nd Street, New York. 519 pp. $10.00.

This volume fills a need for a practical, informative study of the large number and kinds of waxes, natural and synthetic, which are available to industry. It is not too technical in content, but confines its attention to sources, properties, the more technical chemical aspects of these materials. The author states that his aim is to provide "ready reference work for chemists and industrialists who require a knowledge of waxes in their line of endeavor," and it is doubtless for these purposes that the book will be found most useful.

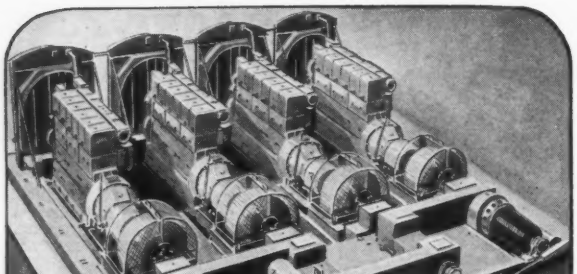
The volume has a considerable number of illustrations, mostly of equipment for recovering and processing waxes, with only a small number of photomicrographs of wax crystals, chemical formulas, and illustrative material discussing the composition and properties of waxes. However, much attention is given to discussing, often too briefly it may seem, the properties of various waxes as applied to their uses in industrial and commercial products. This phase of the book, at least as far as it goes into detail, is of real importance to the student and the industrial technologist who require more data of this practical nature than of more scientific and chemical knowledge. Numerous tables of physical and/or chemical properties are given, showing values of many test-method results of greater importance to the factory manager than to the research or experimental chemist. The author has done a good, if sometimes apparently too brief, job of bringing together and condensing a great mass of data from the literature into easily digestible form.

Chapterwise the book discusses in turn the chemical composition of waxes, takes up the various families of natural and synthetic waxes, including petroleum, fossil, and chemically synthesized waxy materials, their derivation and specific properties. Fatty acids, esters, naphthenates, soaps, and emulsions are discussed at some length. The chapter on petroleum waxes gives considerable attention to the more recently commercialized microwaxes, their source, refinement, and application, with a good amount of tabular data. Petroleum waxes (paraffin waxes) are divided into three main classifications, the paraffin, petrolatum, and petroleum ceresin groups, which are divided further into six subgroups.

One chapter is devoted to a satisfactory discussion of test methods and their results. The last chapter, on Wax Technology, occupying with the appendices 142 of the book's pages, will be found useful to the industrial chemist and manufacturer; it gives fewer formulas for products than other works, but more pertinent discussion of properties and general data of wide usefulness. The use of two thermometric scales somewhat haphazardly tends to be confusing at times; colloquial language often induces sloppiness of expression, but the meaning is usually quite clear.

REPORT ON SECONDARY-RECOVERY POSSIBILITIES OF THE WESTERN PART OF THE DELAWARE-CHILDERS FIELD, NOWATA COUNTY, OKLAHOMA. Published by U. S. Geological Survey. By I. W. Fox, R. L. Ginter, and G. P. Alden. 113 pp.

This is the fourth in a series of informal oil-field reports recently issued by the U. S. G. S. The report includes 20 tables and 33 plates. Reviewed are the early history of the field, the productivity of the wells, results of efforts to stimulate production by the application of vacuum and air-gas recycling projects, and surface and subsurface water supplies relative to source, quantity, and quality. In addition the investment in a system to obtain and dis-



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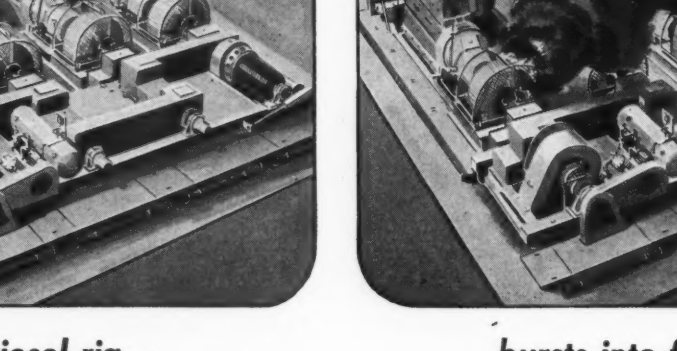

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tribute water is appraised. Conclusions as to future exploitation by secondary-recovery methods are drawn, and estimates are given of the total yield of oil by water flooding. Copies of the report may be had by interested lessees and operators upon request to the Oil and Gas Supervisor, U. S. G. S., Federal Building, Tulsa.

ROTARY DRILLING HANDBOOK. By J. E. Brantly. Published by Palmer Publications, 412 West Sixth Street, Los Angeles. 568 pp. $7.50.

This is the fourth edition of this work, which is divided into 26 chapters, a glossary, and 191 pages of formulas and reference tables. The 26 chapters cover the whole range of operations, equipment, and accessories of rotary drilling, through power plants, pumps, derricks, engines and hoists, rotry-table units, feed controls, derrick equipment, lubrication, wire lines, drilling shaft, pipe and depth measurements, bits, drilling fluid, rotating speeds, weight on bit, instruments, directional drilling, fishing, casing and cementing, formation testing, hole sizes, safety measures, geology and formations, to methods of accounting pertaining to oil-well drilling. The book is of convenient pocket size.

SYNTHETIC PETROLEUM FROM THE SYNTHINE PROCESS. By B. H. Weil and J. C. Lane. Published by Remsen Press, Chemical Publishing Co., 26 Court Street, Brooklyn, N. Y. 303 pp. $6.75.

The colossal undertaking of summarizing the voluminous literature on the so-called Fischer-Tropsch synthesis of hydrocarbons and chemicals from carbon monoxide-hydrogen gas mixtures is indicated by H. H. Storch, chief of the Bureau of Mines research and development division in Pittsburgh and authority on the synthesis, in his brief foreword describing the book and the status of the process, "An incomplete moving picture of the erection of a large building. . . The basic foundation is visible, along with a few parts of the superstructure. . . Without access to the architect's final plans, however, one can only guess as to the details. . ." For this book can give only glimpses at the numerous phases of the process built around a general reaction which has been characterized as "the most versatile reaction in organic synthesis."

Covering nearly 500 literature references in 20 chapters and three appendices, and listing several hundred United States and foreign patents along with 157 U. S. Government-released synthine reports from data assembled in postwar Germany and an imposing number of more recent articles, the book does an excellent job of boiling down the bare essentials of the findings of the large number of researchers which have reported during the 20 years and more since Franz Fischer and Hans Tropsch first made the reaction front-page scientific news. The assembly of data and of references simplifies tremendously the job of the investigator and the literature researcher in ferreting out the most important facts and developments, and the pertinent findings of the recent as well as earlier research men who have studied the problem exhaustively.

The book should appeal to two main groups of readers as well as to students in general in this field; those who wish to obtain a general thinking knowledge of the developments without digging too deeply into the details will find it an excellent resume of fundamental chemical and technical facts; for those who wish to delve deeply into the subject and require a guide book it likewise will serve to separate much of the wheat from the chaff and to shorten the total time required to cover the field.

An excellent though necessarily brief review of the published information on the present economic position of the process is given in the last four chapters. In view of the current importance of the synthesis from natural gas it may be considered that the chapter on production of synthesis gas from that source is scanty and inadequate; this condition arises doubtless because of the meagerness of the technical data which have been published to date. Some attention is given to underground gasification of coal, with practically all references being to Russian sources.

FORMING OF AUSTENITIC CHROMIUM-NICKEL STAINLESS STEELS. Assembled and edited by Vsevolod N. Krivobok, Sc. D., and George Sachs. Published by The International Nickel Co., Inc., 67 Wall Street, New York 5. 309 pp. $4.

This book was compiled to give fabricators of metal equipment a better understanding of the exceptional adaptability of stainless steels to all modern processes of forming. It presents a detailed description of the modern forming procedures as applied to chromium-nickel stainless steels and as practiced in the fabrication plants of the United States. Bending and straight flanging; forming of curved sections and tubing; deep drawing; die forming; forming of contoured-flanged parts, and forming by miscellaneous methods are some of the methods discussed in the book.

The specific examples of forming technique are supplemented by details of tool design and tool materials, lubricants, data on dimensions, and consecutive steps in fabrication.

CHAMBERS MINERALOGICAL DICTIONARY. Published by Chemical Publishing Co., Inc., Brooklyn. $4.75.

More than 1,400 mineralogical terms are included in this dictionary. It lists the chemical composition, crystal form, physical and chemical properties, occurrences, and uses of these minerals. The 40 plates, in full color, will help the reader recognize them. Geologists, mineralogists, metallurgists, chemists, and others, will find this volume very useful.

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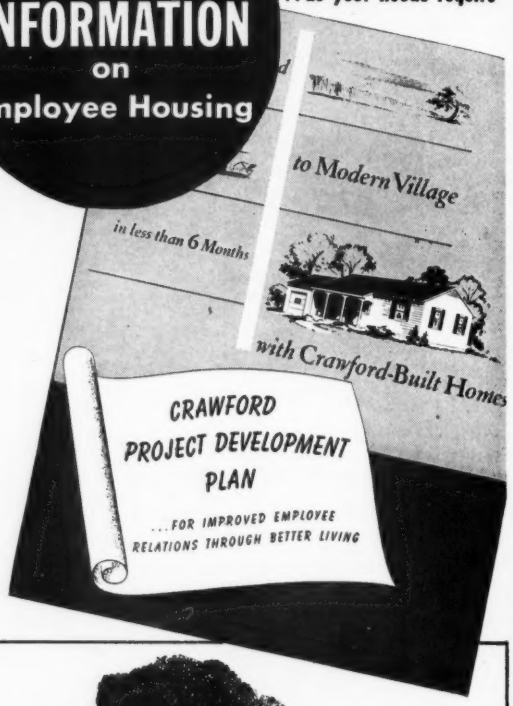

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Stuck Point of Frozen Pipe Accurately Determined by New Electronic Tool

by Herndon David

ONE of the most recent applications of electronics to oil-well drilling operations is in a new tool called the Magna-Tector, which is utilized to locate accurately the stuck point in a string of frozen drill pipe, casing, or tubing. This new tool has been employed to date in more than 2,000 jobs in numerous fields—many of these under adverse down-the-hole conditions—and has proved successful in obtaining maximum recovery of drill pipe or casing, securing savings in operating time, and reducing the amount of redrill footage required after a fishing job.

Uses of Magna-Tector

Primarily, the Magna-Tector is used to locate the exact point at which drill pipe, casing, or tubing is stuck in a well, or the lowest point from which it can be recovered. It has been demonstrated that the stuck point can be located within 1 ft.

Other uses for which the tool have been employed are:

1. To determine whether the tubing is stuck above or below a packer or tubing hanger.
2. To recover all casing possible, in one length with only one inside cut.
3. To test a string of casing, to measure strain or compression.
4. To assure that the string is actually in tension when landing casing.
5. To locate the top of cement around casing.
6. To locate tool joints of internal upset in drill pipe.

One of its most important benefits is the elimination of cut-and-try fishing methods which so often cause complications and damage to the well. Some of the other benefits are as follows:

1. Effects a saving in the number of cuts or shots required to recover pipe. Usually one cut is all that is necessary; hence, all the recoverable pipe, casing, drill pipe, or tubing is pulled in one piece at one time.
2. Saves rig time by locating stuck point quickly.
3. Saves pipe footage by allowing cutting, shooting, or backing off at the deepest possible point.
4. Makes subsequent fishing operations easy and simple.
5. Saves time and tools and minimizes chances for accidents, delays or damage.

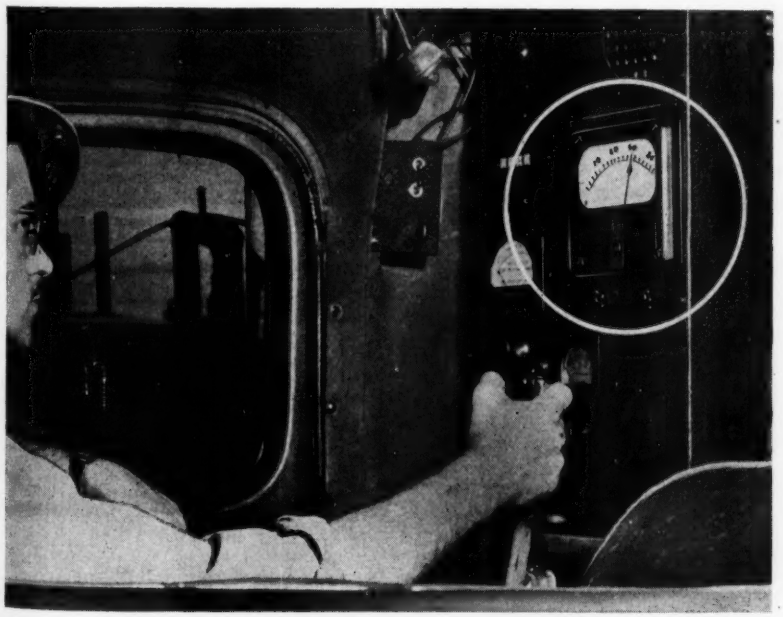

Fig. 1—Simple control panel in service truck allows operator quick and accurate control of Magna-Tector

Fig. 2—Service engineer makes final adjustments on Magna-Tector prior to running tool into hole. Small portable meter resting on rotary table records findings of tool

6. Indicates the proper elevation at which to spot oil for freeing pipe.
7. Eliminates estimates and calculations based on pipe stretch.
8. Determines, in many cases, the actual sticking medium.
9. Minimizes redrill footage.

Principle of Operation

Essentially, the instrument consists of two magnets of special design, in combination with a telescopic joint with which is combined a sensitive electronic device. It is run into the well until the elevation selected for testing is reached. Then electric current is turned into the conductor cable, energizing the two magnets and causing them to cling to the wall of

the pipe, fixing the tool in relation to the pipe.

Upward strain is then applied to the pipe, causing stretch or elongation in the section which is free. Any stretch or elongation naturally moves the two magnets apart. This separation of the magnets, which may be as little as 0.001 in., is detected by the sensitive electronic element and transmitted to the meter at the surface. If the pipe is stuck, or rigidly held against elongation at the elevation at which a test is being made, there will be no pipe stretch to actuate the electronic element, and therefore no reading on the meter. When this condition is met, the instrument is set at progressively higher points until pipe stretch is indicated. Once this point is reached, a few more settings locate the exact stuck point quickly and positively.

Resetting the tool for testing at different levels requires only the shutting off of the current, moving to a new location, and reenergizing the magnets. As many settings as desired may be made without coming out of the hole.

The mechanism of the detecting device is insulated and sealed in a bath of liquid silicone which renders it immune to the effect of hydrostatic pressure, fluid, or temperature change. In addition, the mechanism is unaffected by crooked hole, friction, or other factors which heretofore have been an unknown quantity when attempting to determine the stuck point by any of the usual methods. The instrument is affected only by conditions existing at the elevation at which the test is being made.

Interesting Jobs

The instrument is so designed and constructed that it is not affected by well fluid, temperature, or hydrostatic pressure. This has been proved by actual and successful operations of the instrument in several of the world's deepest wells, under most severe conditions including mud weight as high as 133 lb. per cubic foot, with a viscosity of 70, hydrosatic pressure in excess of 15,000 psi., and temperatures as high as 460° F. Despite these conditions, the equipment was run without trouble, and operated successfully at depths below 16,000 ft.

The tool has also been used in numerous directionally drilled wells with angles as high as 70° from the vertical. The severe angle of these holes sometimes make it necessary to pump the tool into position, yet the tester worked perfectly, and located the lowest free point where the pipe was backed off successfully.

Some interesting jobs on which the instrument has been employed are as follows:

1. In one well 10,700 ft. of drill pipe was stuck shortly after starting out of the hole with a removable whipstock. After numerous attempts to free the pipe by circulating oil had failed, the magnetic tester was run into the well and located the stuck point below the drill collars with only four different settings.

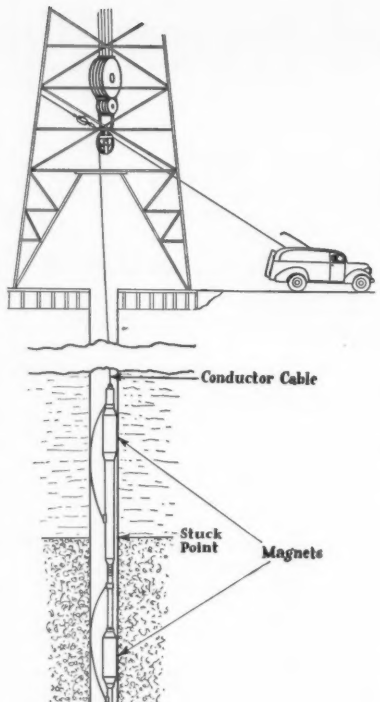

Fig. 3—Magna-Tector in operation. After tool has been run into well, electric current is applied through conductor cable to energize magnets and cause them to cling to casing. Tension is then applied to casing at the surface and, if the stuck point is between the two magnets as illustrated, stretch of the casing above the stuck point will cause the two magnets to be separated by a greater distance than before the tension was applied. This separation of the magnets is recorded at the surface, indicating that the stuck point has been located. Separations of the magnets as small as .001 in. can be detected by the tool. Several settings of the tool generally are required before the stuck point is located, but determination of the stuck point is accurate to within 1 ft.

A string shot was then run into the hole and detonated opposite the first joint above the indicated free point. All the pipe was backed off successfully at that point on the first attempt. If the usual cut and try procedure had been resorted to on this job, the time involved and the cost of recovering the fish probably would have been prohibitive.

2. A second interesting job was occasioned when drill pipe became frozen in a very crooked, high-angle well in Long Beach Harbor field in California. This particular well was intentionally directioned from the surface and reached an angle of 70° from the perpendicular. It dropped back in one place to 35° and built up in the lower portion of the hole to 54°. There were several distinct dog legs. The tester run into this well ascertained the freeze point to be at one of the dog legs and a string shot was run and the pipe backed off successfully.

3. When drill pipe became stuck recently in a well at Santa Paula, Calif., it was assumed that the drill collars were stuck (the common first thought). Consequently, oil was spotted and rocked only as high as the drill collars. After a reasonable attempt was made to free the drill pipe with oil, a Magna-Tector was run and found the stuck pipe to be 300 ft. above the top of the collars. The slug of oil was then moved up to that point and within a few hours the pipe was free. In cases such as this, where the pipe is to be oiled free, the tool provides definite information as to where to spot the oil.

4. The equipment has been used to locate the lowest free point in liners. To accomplish a test in a liner that is hung in casing, or set on bottom, it is necessary to engage the top of the liner with a spear or other fishing tool that has an inside diameter of not less than 2 in. through which the tool can be run. It is good practice to cut off and remove the liner top, adapter or hanger before making a test. Quite often it is possible to recover a liner intact by the alternate use of the Magna-Tector and a perforation washer.

During the more than 2,000 jobs performed, successful runs have been made in casing ranging in size from 4 to 13⅜-in. o.d. and in tubing and drill pipe under varying down-the-hole conditions. The increasing use of the new tool has been due primarily to its simplicity of design and operation and its ability to save valuable pipe at a time when pipe is at the top of the list of critical materials.

Oil Committee Revived Though Chairman Quits

WASHINGTON. — The petroleum subcommittee of the Senate interstate commerce committee was revived last week with Sen. Clyde M. Reed of Kansas as chairman in place of Sen. Charles W. Tobey of New Hampshire.

Tentative plans of the subcommittee call for the holding of a hearing or two before adjournment, but there is some doubt whether this will be done in view of a call by Republican leaders for the skipping of all hearings which do not have a bearing on legislation on the "must" list.

Reed was put at the head of the subcommittee after Tobey refused to serve, on the ground that the industry had relieved the supply situation which the group was set up to deal with and conditions now are satisfactory.

QUESTIONS on TECHNOLOGY

by W. L. Nelson

Consulting Engineer

Antiknock Compounds

Why is tetraethyl lead the only thing used for gasoline? What other agents are used?—F.C.E.

Little has been done about antiknock agents since about 1930 when Campbell, Lovell and Boyd *(The Oil and Gas Journal, January 23, 1930, p. 42)* presented their comprehensive study of such materials and which lead to the primary position of Ethyl Corp. If materials more powerful than tetraethyl lead have been developed they are not mentioned in the literature (other than patents). Among the substances studied in the 1930 report are those shown in Table 1. In this table the effectiveness of antiknock compounds is compared as the reciprocal of the number of mols that will give the same antiknock effect as one mol of aniline.

Table 1.—Effectiveness of Antiknock Compounds (Campbell, Lovell, and Boyd)

Benzene	0.085
isooctane	0.085
Ethyl alcohol	0.104
Xylene	0.142
Aniline	1.000
Ethyl iodide	1.09
Titanium tetrachloride	3.2
Tin tetraethyl	4.0
Diethyl selenide	6.9
Diethyl telluride	26.6
Nickel carbonyl	35
Iron carbonyl	50
Lead tetraethyl	118

Meaning of "Refining Crude Oil"

We have heard the term "refining crude oil" used. What exactly is meant by such a designation? How would crude oils be used if they are not refined?—F.C.E.

Undoubtedly different meanings of the term "refining crude oil" are employed by different petroleum refiners.

In a broad way, crude oils that are not of the "refining" variety are deficient in some respect such as a low gravity, lack of gasoline, or a high percentage of sulfur or of asphalt. The crude-oil field may also be so inaccessible that the crude oil must either be sold in the vicinity of the field for purposes other than the refining of it, or not sold at all. Some crude oils may be utilized directly without refining, as fuel oils, as dusting oil for roads or coal, as slow-curing road oils, and perhaps as spray oils for discouraging insects. The outputs of a few entire fields have been disposed of as black fuel oil.

One California refiner designates "refining crude oils" as ones which are so deficient in gasoline that they need not be processed by topping or straight-run distillation. It is also inferred that they may be processed by cracking in a refinery.

Many refiners segregate their crude oils into two varieties, those suitable for the manufacture of lubricating oils and those that are processed for gasoline by topping and cracking. The crude oils that are valuable for lubricants are usually referred to as lube crude, select crude, light crude, etc., and occasionally as refining crude.

Reference to "Stacks"

Can you direct us to references and engineering data on the proper installation and construction of steel stacks for pipe stills and boiler houses? C. H. T.

Little information on this specific subject is available, particularly with regard to the guying or anchoring of stacks. Among the articles readily available, only V. O. Marshall ("The Design of Foundations for Stacks and Towers," Petroleum Refiner, August 1943, p. 101) discusses guyed towers and the pull on guy wires.

The lining of steel stacks to protect them from corrosion and heat is discussed in the April 1947 issue of Power Plant Engineering, p. 116 (Concrete Linings in Steel Stacks) by G. T. Haddock. The low temperatures now being employed in large power plants intensify the corrosion.

The design of anchor bolts for stacks or vertical towers or vessels is discussed in the following five articles:

Brummerstedt, E. F., "Design of Anchor Bolts for Stacks and Towers," Tech. Sect., Nat. Pet. News, Jan. 5, 1944.

Anonymous, "Making Forms for Concrete and Setting Anchor Bolts," The Oil and Gas Journal, December 5, 1945, p. 113.

Jorgensen, S. M., "Anchor-Bolt Calculations," Pet. Refiner, May 1946, p. 97.

Lewaren, S. W., Anchor-Bolt Design for All Refinery Vessels, The Oil and Gas Journal, June 14, 1947, p. 127.

Sterrett, E., "Shock Absorbers for Foundation Bolts, Pet. Engineer, Jan. 1936, p. 52.

The pressure caused by wind is fundamentally important *(Nelson, W. L., "Pressure Caused by Wind," The Oil and Gas Journal, May 4, 1944, p. 86)*. Stacks cannot be designed for the wind loads that will be encountered in tornadoes or hurricanes because of the excessive cost.

In determining the draft that a stack or chimney will produce, the loss in temperature of the gases as they flow through the stack is vital. This subject has seldom been discussed in recent years *(Nelson, W. L., "Loss in Temperature of Stack Gases," The Oil and Gas Journal, September 30, 1943, p. 56)*.

The general design of self-supporting stacks or their sizing has been discussed in the following 10 articles:

Levine, S., "Method of Design of Steel Stacks and Foundations," Pet. Refiner, April 1943, p. 104.

Marshall, V. O., "The Design of Foundations for Stacks and Towers," Pet. Refiner, Aug. 1943, p. 101.

Garnett, S., "Notes on Design of Foundations for Stacks and Towers," Pet. Refiner, Oct. 1943, p. 128.

Garnett, S., "Design of Foundations for Elevated Towers," Pet. Refiner, Feb. 1944, p. 88.

Shjarback, J. A., "Practical Design of Foundations for Vertical and Horizontal Vessels in Refineries," Pet. Engineer, Ref. Annual, 1944, p. 217.

Nelson, W. L., "Self-Supporting Foundations for Towers and Stacks," The Oil and Gas Journal, Aug. 4, 1945, p. 103.

Nelson, W. L., "Theoretical Stack Draft," The Oil and Gas Journal, March 15, 1947, p. 101.

Nelson, W. L., 50-Ft. "Steel Stacks," The Oil and Gas Journal, March 29, 1947, p. 177.

Nelson, W. L., "Draft in 100-Ft. Stacks," The Oil and Gas Journal, April 12, 1947, p. 103.

Nelson, W. L., "Stack Size—Furnace Draft," The Oil and Gas Journal, April 19, 1947, p. 135.

Gyro Vapor Phase Process

What has happened to the Gyro vapor-phase process? Would it be useful for making chemicals or chemical hydrocarbons today?—R. M. G.

According to yearly refinery statistics in The Oil and Gas Journal and various Bureau of Mines Information Circulars entitled, Survey of Cracking Plants, etc., the Gyro process was used somewhat as follows:

	Bbl. per day	Units
1928	1,000	1
1929	8,200	11
1930	9,200	13
1931	16,000	20
1932	20,400	21
1933	23,800	27
1936	none listed	

The real situation may not be clear in the above tabulation because many refiners hesitated to name their cracking processes during these years.

The use of a high-temperature process is the obvious way to produce the unsaturated hydrocarbons that are so useful in chemical manufacture. The temperature must be so high that the process becomes a vapor-phase one. The Gyro process could be used, and due to the extensive commercial development of the Gyro process during 1928-1932 it might be a more useful process than other less widely used ones.

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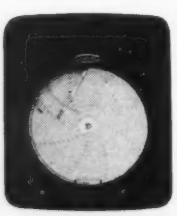
Dynalog Instruments are widely recognized, also, for their mechanical simplicity. They have *fewer* moving parts, and *no* parts moving faster than the pen . . . hence maintenance is virtually eliminated. There's no slide wire, no galvanometer, no batteries, no gears, no moving contacts. A simple balancing capacitor, driven by a powerful push-pull magnetic positioner, entirely does away with all ordinary causes of trouble or failure.

Using other primary elements, Dynalog Instruments are available for the measurement or control of pH, flow, pressure, and other process variables. *Write for Bulletin 397.* **The Foxboro Company, 60 Neponset Avenue, Foxboro, Mass., U. S. A.**



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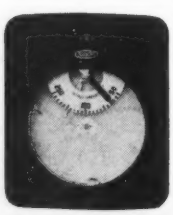
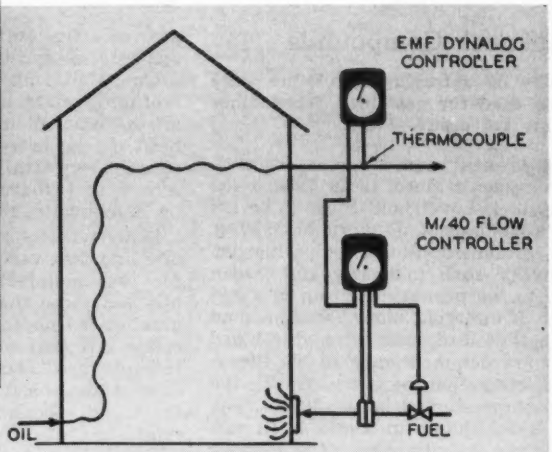
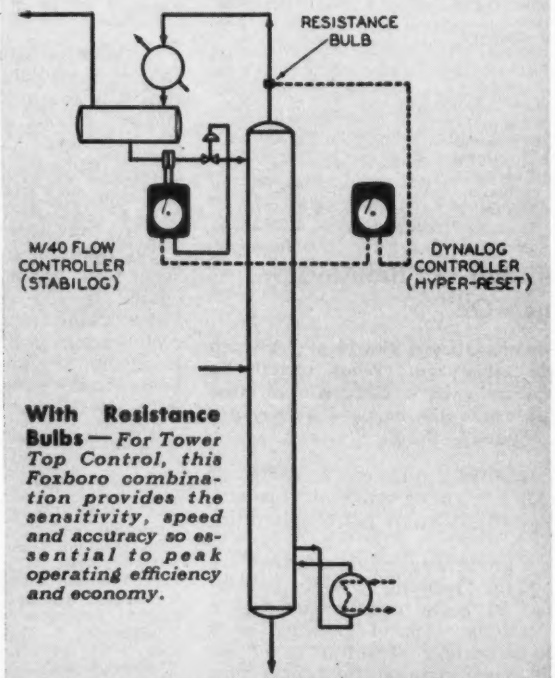




With Thermocouples—*On Pipe Stills, This Foxboro Combination assures extremely accurate, trouble-free control of transfer line temperatures under all conditions.*



With Resistance Bulbs—*For Tower Top Control, this Foxboro combination provides the sensitivity, speed and accuracy so essential to peak operating efficiency and economy.*

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ELECTRONIC INSTRUMENTS

JOURNAL-*Guide* TO

Kern Bluff

Kern County, California

KERN Bluff field, Kern County, California, currently is the most active of the new fields in the state with more than five locations and three to six rigs running.

Pays.—Three shallow pay zones have been found productive in the field; however, all three pays have not yet been found productive in any one well. Main pay zone is the Santa Margarita oil sand at a depth of approximately 872 ft. Actually, this is a Transition sand between the base of the Kern River-Chanac and the Santa Margarita, but it has been named the Santa Margarita oil sand in this field. Average thickness of this sand is 55 to 60 ft.

Other two productive horizons are the Transition oil silt at a depth of 823 ft. and the Santa Margarita carbonaceous silt at a depth of 931 ft. The Transition oil silt averages 25 ft. in thickness, while the thickness of the carbonaceous silt has not been determined. The majority of wells in the field have been completed only in the main pay zone, although in some of them the Transition silt has been left open to production, adding about 20 bbl. per day to the initial production gage of the wells.

A standard spacing pattern of 36 wells to each 160 acres (or 1 well to each 4.4 acres) has been adopted in the field. There is no townsite drilling or difficult terrain to complicate this pattern.

Casing and bits.—Standard casing program accepted in the field consists of 875 ft. of 8⅝-in. casing and 85 ft. of 7-in. liner, the latter including 75 ft. of 130-mesh perforations. Average hole requires 365 sacks of cement for setting the 8⅝-in. casing, the cement being brought all the way back to the surface in each case.

Two 12¼-in. rock bits generally suffice in drilling surface hole, which is carried down to 20 ft. below the base of the Kern River-Chanac at approximately 790 ft. Hole is then cored continuously to bottom with four 7⅝-in. drag bits. Often two rock heads and two drag bits are used for coring instead of the four drag bits. Approximately 125 sacks of bentonite mud are required for drilling the average hole.

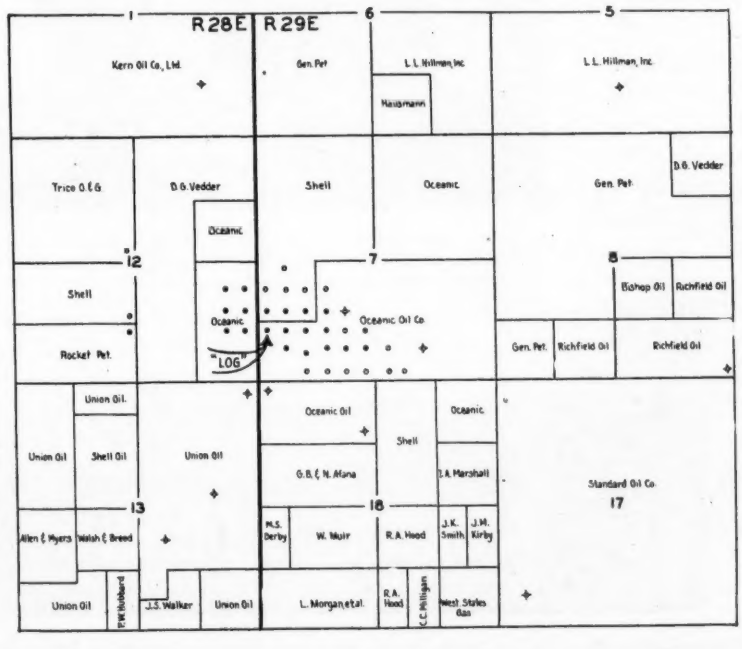
Contract terms.—Contracts are let on a footage-plus-day-work basis, with the operator preparing the location and supplying the water and cement. No substructures are used and the contractor is required to supply the derrick and fuel. Cost of drilling mud is split between the operator and the contractor. In this case a maximum figure is established and the contractor is required to furnish mud up to this cost. Should more mud be required, the operator pays all mud costs above the maximum figure established. All of the drilling units so far in the field have been small power rigs.

Drilling conditions.—No high-pressure gas or water-flow problems; lost-circulation problems; or heaving, caving, or sloughing shale problems have been encountered in the field. Principal drilling difficulties are encountered in coring the productive sand. This sand is very coarse and full of cobbles and limy sandstone shells. These cobbles and shells often lodge in the core catcher and cause lost recovery, forcing the use of rock heads to core the 7⅝-in. hole. Thus crews are often forced to use as many rock heads as drag heads in coring below the surface string.

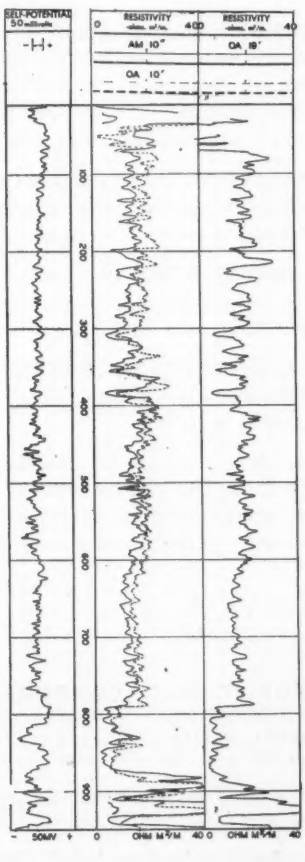
General drilling practice is as follows: Two 12¼-in. rock bits are used to drill surface hole to a depth approximately 20 ft. below the base of the Kern-River-Chanac formation. An electric log is then run and the hole size reduced to 7⅝ in. and cored continuously to bottom, an attempt being made to bottom all wells in the carbonaceous silt. An electric log is run again at total depth. Following this, 8⅝-in. casing is run about 3 ft. into the sand. After water-shutoff tests are made, the hole is cleaned out to bottom with a 7⅝-in. bit and drilling mud is displaced with 19°-gravity oil. The hole is then reamed from the casing shoe to total depth with a 9½-in. underreamer and the liner dropped in. Tubing is run to complete the well.

All wells in Kern Bluff field are shallow and drilling is rapid, 5 days being required for drilling the average well. Breakdown for drilling time is about as follows: Rigging up—½ day; drilling (bit on bottom)—2½ days; running casing and waiting on cement—1½ days, and time for logging, etc., 1 day.

A ¾-mile westerly extension of the field recently completed by Rocket Petroleum Co. has added several hundred acres to the productive area of the field.



Field map and log for Kern Bluff, California



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STRENGTH—Through the use of alloy steels, highest strength values may be obtained without loading working parts with unnecessary weight or size. Furthermore, alloy steels maintain their strength throughout wide ranges of temperature.

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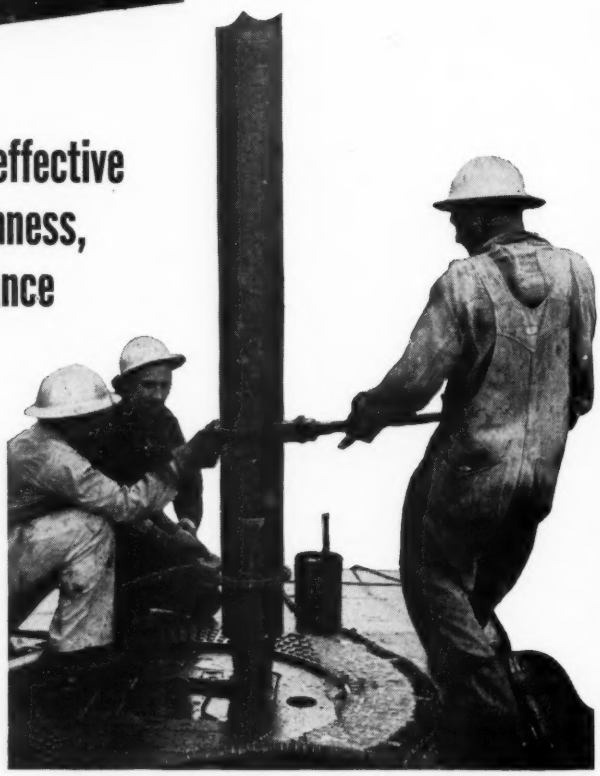
Republic—world leader in alloy steel making—is anxious to give you the benefit of its wide experience in applying alloy steels for greater safety—for increased efficiency and economy, too. Write us.



Making up "sub" on a drill collar. Greater safety is assured in deep well drilling through the use of alloy steels for drill collars and the "subs" or substitutes which connect them. Alloy steels help increase safety in drilling, too, when used for drill bits, tool joints, kellys, swivels, blocks, pumps, draw works and high-pressure equipment. Ask Republic metallurgists what these steels can do for you.

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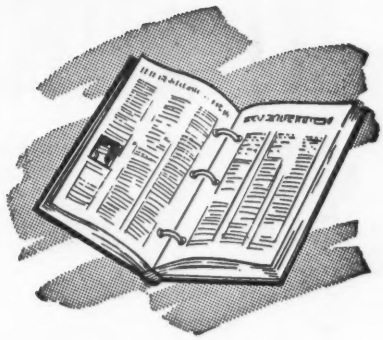
The Refiner's Notebook

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL



Retiring Thickness

1¼ and 6-In. Pipe

BASIS—GRADE A SEAMLESS STEEL PIPE (BUT A STRESS VALUE "S" OF 12,000 AT 750° F.)

$$t_m = \frac{PD}{2S} + C$$

t_m = minimum thickness, in.

P = internal minus external pressure, psia.

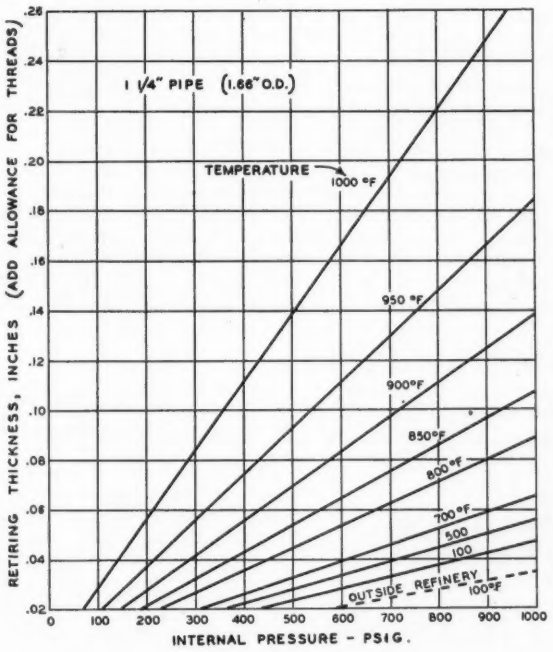
D = actual outside diameter, in.

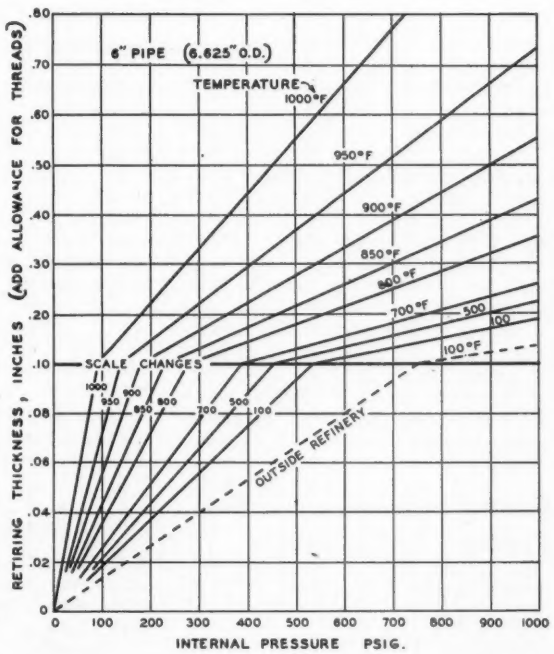
S = allowable metal stress, psi. (see tabulation of materials)

C = allowance for threading, welding, mechanical strength and/or corrosion

Values of C		Other materials	Specification	Multiplier for thickness
Welding	0.05	Grade A seamless	A.S.T.M.-106 A.P.I.-5L	1.0
		Grade B seamless	A.S.T.M.-106	.77
Pipe threads		Grade B seamless	A.P.I.-5L	.80
⅛-in.	0.03	Grade C seamless	A.S.T.M.-106, A.P.I.-5L	.64
¼-⅜-in.	0.044	Lap welded	A.S.T.M.-53, A.P.I.-5L	1.33
½-¾-in.	0.057	Butt welded	A.S.T.M.-53, A.P.I.-5L	1.60
½-in.	0.07			
2-in. up	0.10			

Refer to Refiner's Notebook No. 192 (Inspection), April 15, 1948, and a correction of Table 2 which appeared May 13, 1948, for a discussion of A.S.A. Code for Refinery and Gasoline Plant Piping, the effect of temperature, etc.





No. 200 in a series by W. L. Nelson, professor of petroleum refinery engineering, University of Tulsa

NATURAL GAS

Gas Waste Hearing Is Set for June 15

AUSTIN.—A "show cause" hearing on alleged wasteful flaring of casing-head gas in Flour Bluff field, Nueces County, Southwest Texas, has been ordered by the Texas Railroad Commission for June 15.

Operators in the field have been directed to appear before the commission on that date to explain why the gas is not being conserved and show cause why the field should not be shut down until the gas is more efficiently utilized. The order followed an inspection of the Flour Bluff gasoline plant by commission engineers from Austin.

Similar "show cause" hearings were held on a number of fields throughout the state more than a year ago as a step in the commission's drive to enforce utilization of oil-well gas. One resulted in the Seeligson field shutdown order which brought a protracted court fight and a Texas Supreme Court decision that the commission had the authority to order field shutdowns in appropriate cases.

Commission proration schedules show nearly 70 wells in the field. Humble Oil & Refining Co. operates all except two each by T. J. Ahern, Barnsdall Oil Co., and Sinclair Prairie Oil Co.

All wells in the field are reported connected to Humble's Flour Bluff gasoline plant which has a rated processing capacity of about 15,000,000 cu. ft. daily. The commission said that in January about 9,700,000 cu. ft. daily was being flared, or 78.4 per cent of the plant's intake of 12,400,000 cu. ft. In April 1947, according to the commission, flaring was at a rate of 8,300,000 cu. ft. daily, or about 72 per cent of the intake of 11,500,000 cu. ft. Higher oil allowables were responsible for the greater production this year.

Contract for Winnie, Tex., Project to Be Let Soon

HOUSTON.—Preliminary company work has been completed and a contract is to be let shortly for the construction of facilities which will virtually double the present 100,000,000 cu. ft. daily capacity of the natural-gasoline plant operated at Winnie, Tex., by Absorption Plant, Inc.

The project is the latest phase to be undertaken in the development of a $15,000,000 chemical-processing installation at Winnie *(The Oil and Gas Journal, January 1, page 48)*. Both Absorption Plant and McCarthy Chemical Co. are controlled by McCarthy Oil & Gas Co., Houston.

The entire project contemplated at Winnie is not expected to be completed until late 1949. It is attracting considerable attention on the Gulf Coast since it is the first property to combine the absorption and chemical operations at one single site and into an integrated plan.

McCarthy's original absorption plant at Winnie went into operation in 1946. When the entire project is finished, the plant will draw on reserves in more than 15 fields, transporting the casing-head and distillate gas through about 250 miles of line.

Unit 1 of the chemical plant went in operation recently. It produces formaldehyde, methanol, and acetaldehyde. Work is continuing on a 6-in. pipe line from Winnie in Jefferson County to a site near Port Neches where a shipping point will be located.

Hugoton Field Gas Price Hearing Set for July 19

Whether the Kansas Corporation Commission has any authority concerning wellhead gas prices in the Hugoton field of southwestern Kansas will be determined at a hearing to be held in Topeka July 19. The hearing was sought by the Southwest Kansas Royalty Owners Association, whose members contend that landowners do not get an adequate price from gas distributing companies.

The association recently proposed 10 cents per 1,000 cu. ft. as a fair price at the wellhead. Conservation officials estimate Hugoton field producers are getting an average of about 5.6 cents per 1,000 cu. ft., or 1.1 cents more than a year ago.

McKamie Field Is Closed

McKamie gas field near Lewisville, Ark., has been closed down for at least 2 weeks while the McKamie Gas Cleaning Co. plant is shut down for inspection. The field closing was ordered by the Arkansas Oil and Gas Commission "to assure no gas would be flared" while the plant is out of operation.

Natural Gasoline

Corrosion Research Group Elects Stewart Chairman

W. H. Stewart, Sun Oil Co., Beaumont, Tex., has been elected chairman of the Corrosion Research Project Committee of the Natural Gasoline Association of America at a recent meeting of the group in Dallas. He succeeds T. S. Bacon, Lone Star Producing Co., Dallas. F. A. Prange, Phillips Petroleum Co., Bartlesville, Okla., was elected vice chairman of the committee and succeeds M. E. Holmberg, also of Phillips.

The cooperative project is financed largely through contributions of 28 producing companies. Its objective is to determine the cause and cure for the destructive corrosion in high pressure gas-condensate wells. A total of $78,000 has been spent on the research programs. This is in addition to the field studies conducted by all the operating companies.

At the recent meeting plans were made for continuing the work for another year and three research programs at the University of Texas were approved.

Southern Union Plans San Juan Basin Plant

Southern Union Gas Co. of Dallas will begin construction this year on a $1,000,000 natural-gasoline plant to be located in Kutz Canyon field near Farmington, N. M. This first gasoline plant to be built in the San Juan Basin of northwest New Mexico will have a daily throughput capacity of 20,000,000 cu. ft. of gas.

The new plant is part of a $5,000,000 budget which the company plans for the coming year. Looping of pipe lines, addition of compressor stations and drilling of further wildcat and field wells, is scheduled in the San Juan basin where Southern Union is the principal operator.

O.W.I.U. Employes Strike At Agua Dulce Plant

CORPUS CHRISTI.—About 30 employes in the Oil Workers International Union went on strike last week at the gasoline plant operated by Agua Dulce Co. in Nueces County, Texas.

A union official said the group is asking sick benefits, union recognition, and a wage increase to $1.85 for top classifications and $1.50 for others. Capacity of the plant is about 40,000 gal. daily of light fractions, including L.P.G.

625 SQUARE FEET OF NET EFFECTIVE FILTERING AREA IN A SINGLE UNIT

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- Lower installed cost
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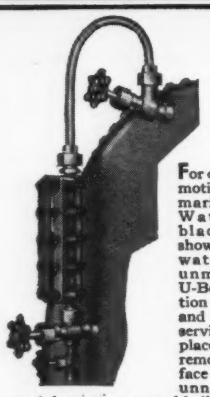
"REFLEX"
WATER GAGE SET



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This is one of the complete line of Penberthy gages that meet every liquid level gage requirement.

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IT'S BETTER

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LOS ANGELES, CALIFORNIA

Among the

Drilling Contractors

Anderson-Carey Drilling Co., Inc., Oklahoma City, and Russell Maguire are drilling a 5,000-ft. test in Oklahoma County, Oklahoma, their 1 E. C. Ogle, NE NE SE 32-13n-1e.

Delta Drilling Co., Evansville, Ind., has brought in what looks like a pool opener for Joe Reznik in Vanderburgh County, Indiana. Well is 1 B. Edmond in 10-7s-11w, and hit pay in McCloskey lime at 2,427-30 ft.

Joe Dunbar, Salem, Ill., has opened new area about 8 miles southeast of Effingham, Ill., in Effingham County. Well is 1 Repking, NW SW NE 8-7n-7e, and it swabbed 70 bbl. daily from Rosiclare lime at 2,652-61 ft.

Luke Grace will drill a wildcat for Burk Royalty Co. et al in Young County, North Texas. Well is 1 Hulse, 4 miles northwest of Proffitt.

Cook Drilling Co., Allegan, Mich., is drilling a wildcat in Allegan County, Michigan, its 1 Richard Harden, SE NE NW 7-2n-13w.

Sanders Drilling Co., Lawrenceville, Ill., has contract for J. S. Young, Jr., 1 Ernest Bosse, wildcat in NW NW SE 2-5s-10w, Vanderburgh County, Indiana.

Harry Stroud, Allegan, Mich., will drill Leonard C. Sleep 1 Ed Wheatley, a South Hopkins field well in NW NE SE 30-3n-12w, Allegan County, Michigan.

Smith, Story & Wood, contractors, are moving in to drill Anderson-Prichard Oil Corp. 1 E. H. Yturria et al, wildcat, in Adam Stafford Survey 49, in Bexar County, Texas, 10 miles southeast of San Antonio. Contract depth is 5,000 ft.

Summit Drilling Co., Tulsa, and **W. F. Bush** have started Wilcox test on north edge of Webb pool, Grant County, Oklahoma. Test is 1 Reed, SE NE NE 35-28n-3w.

Meredith, Clegg & Hunt of Houston have completed as a producer the Brown Unit No. 1 for Atlantic Refining Co. in North Tepetate field, Acadia Parish, Louisiana, and are drilling at 7,819 ft. on the 2 Doga for the same company. Same contractors also set 5½-in. oil string at 8,131 ft. in Atlantic, Klumpp B-4 in this field and are getting ready to complete.

Palmer & Son are contractors for Fisher-McCall Oil & Gas, Inc., 2 J. Thomas, East Monterey field well in NE NW SW 13-3n-12w, Allegan County, Michigan.

Max Spidel, Allegan, Mich., is contractor for Louis Zellman 2 Mrs. B. Zellman, wildcat in NE NE NW 25-4n-13w, Allegan County, Michigan.

Woods Drilling Co., Tulsa and New Orleans, will drill a deep test in Goliad County, Texas, early in June. Well is in northwest corner of H. M. C. Hall Survey and will go 1,000 ft. into the Wilcox sand of 10,300 ft. Test is being supported by Amerada Petroleum Corp., Phillips Petroleum Co., Ohio Oil Co., Sun Oil Co., and Atlantic Refining Co.

C. E. O'Neal & Co., Evansville, Ind., will make hole on 2,800-ft. test for John B. Buchman, his 3 Lena Wassmer et al, NE NE W½ SW 6-5s-11w, Vanderburgh County, Indiana.

C. & B. Drilling Co., Odessa, Tex., has contract for George W. Strake 1-C Smith Land & Cattle Co.-German Emigration Co. Survey 610, 6 miles southwest of Paint Rock in northwest Concho County, West Texas. The 4,800-ft. wildcat will be a combination cable-tool and rotary operation.

Taggart Drilling Co., Big Rapids, Mich., will drill a Cranberry Lake "facility" well for Michigan Gas Storage Co. in C SW NW 8-20n-5w, Clare County, Michigan.

C. H. Holland, Princeton, Ind., has contract for Kirk D. Holland 5 Warner Robling Estate, SW NW SW 32-1n-9w, a 1,700-ft. test to the Rosiclare in Pike County, Indiana.

Cumbie & Collins Drilling Co., Ardmore, Okla., is planning a 2,000-ft. test in Carter County, Oklahoma, its 2 Mollie Ingram, NE SE NW 15-4s-3w.

Pioneer Drilling Co., Henderson, Ky., has started wildcat for George Engle in Webster County, Kentucky, his 1 Chandler-Pettus, 1-L-24.

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EXPERIENCED PRACTICAL CONSULTING REPRESSURING AND WATER FLOODING PRODUCTION ENGINEERING SERVICE

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Is the driller's best friend because it makes the easiest brake known and "feeds off evenly while drilling." It never scores brake rims. See pages 3608-3613, Composite Catalog.

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HOUSTON

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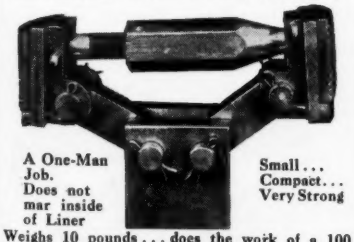
The Answer to Liner-Puller Problems



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Small... Compact... Very Strong

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STOUT-OWENS LINER PULLER CO.
225 W. 9th, Hutchinson, Kansas

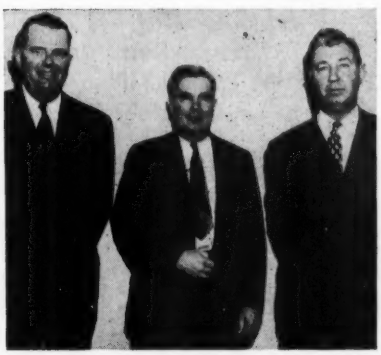
Meredith, Clegg & Hunt, Houston

OPERATING five rigs, Meredith, Clegg & Hunt have drilled a total of 44 wells in the Gulf Coast area since the company was organized in November 1946. The five heavy-duty rigs include four steam and one power. Present offices are in the Neils Esperson Building, Houston.

Personnel.—President of the company is Byron Meredith who from 1918 to 1946 was with Sinclair Prairie Oil Co. and its predecessors. Other officers are: M. F. Clegg, vice president, and L. M. Hunt, secretary-treasurer. Tool pushers are: I. L. West, Houston; Emmette Williams, Kingsville; Kenneth Grissom, Lake Charles, La.; and Leroy Bond and Lee Voss, Eunice, La.

History.—The present company grew out of the consolidation in November 1946 of Morris & Meredith, Houston, and Clegg Drilling Co., Corpus Christi. Hunt was associated with Clegg. Morris and Meredith brought three rigs into the enlarged firm, and Clegg, two rigs.

Operations.—Meredith, Clegg & Hunt's power rig is now beginning work on an 11,000-ft. job for Sohio Petroleum Co. in Cameron Parish, Louisiana. This wildcat is being drilled for a piling structure only a few hundred yards inland from the Gulf of Mexico shore. The steam rigs are operating as follows: Tide Water Associated Oil Co., Nueces County, west of Corpus Christi; The Coast Co., dual producer recently completed in Colorado County; and two in North Tepetate field, Acadia Parish, Louisiana, for Atlantic Refining Co.



Officers of Meredith, Clegg & Hunt: L. M. Hunt, Byron Meredith, and M. F. Clegg

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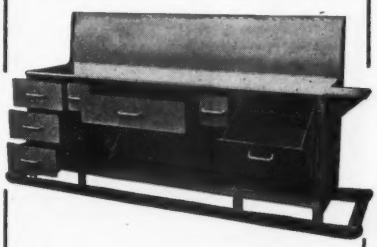

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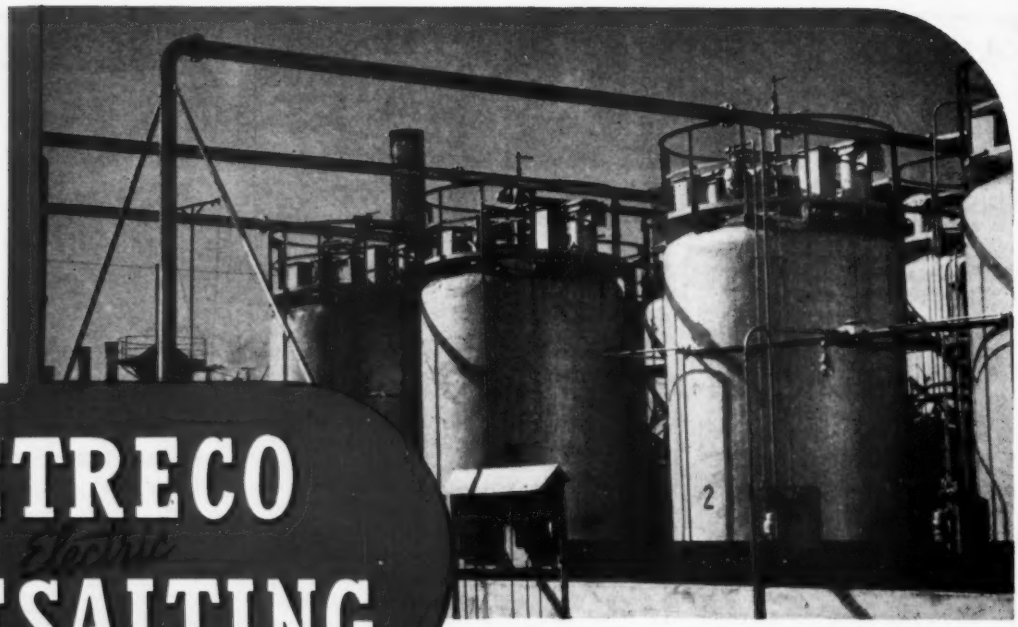

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PR 48-1

REFINING

Continental Buys Second Ponca City Plant from WAA

Continental Oil Co. has purchased from War Assets Administration for approximately $175,000, the Ponca City, Okla., toluene plant erected during the war by Defense Plant Corp. and used in the manufacture of nitration-grade toluene and aviation gasoline.

The plant, which was completed in September 1943, was the first used to manufacture nitration-grade toluene used in the production of war bombs. It was later converted so as to produce toluene as a blending agent for the first 100-octane aviation gasoline manufactured in Oklahoma.

In July 1945 the plant was closed and remained inactive until the latter part of 1946, when it was leased by Continental Oil Co. to be used periodically for the manufacture of gasoline and other products.

Early this year Continental purchased for $3,125,000 the huge 100-octane gasoline plant in Ponca City, erected during the war by Defense Plant Corp. The plant includes Thermofor catalytic cracking and retreating units with a capacity for cracking of 20,000 bbl. daily of gas oil and treating 6,000 bbl. daily. Continental operated the plant during the war as lessee.

Skelly to Add 35,000 Bbl. To El Dorado Refinery

Plans for enlarging and modernizing the El Dorado, Kans., refinery of Skelly Oil Co., originally announced in April, have been expanded and now call for adding approximately 35,000 bbl. per day of crude-oil charging capacity, with commensurate expansion in the catalytic cracking unit and attendant facilities.

The expansion will provide in excess of 45,000 bbl. per day of refined petroleum products from the company's refining and natural-gasoline plant operations. The construction work will be done by M. W. Kellogg Co., and is scheduled for completion in January 1950.

Socony Develops New Gear Lubricants

NEW YORK. — Development of a new, single, multipurpose type of gear lubricant, suitable equally for all automotive axles and transmissions except the automatic kind, has been announced by Socony-Vacuum Oil Co., Inc. This lubricant, known as GX-80, GX-90 and GX-140, corresponds to the different seasonal grades in common use.

The lubricants are said to be highly stable and noncorrosive, reducing any tendency toward foaming and corrosion in service. No lead compounds are included in these lubricants, it is stated, and they are suited especially to lubrication of hypoid-gear axles. They may be used also in heavy-duty, high-temperature bus and truck axles of hypoid, double-reduction or bevel gear types, officials state.

Bright Stock, Paraffin Show Gain in April

Production of bright stock and paraffin oils showed an increase during April, while a drop in production was reported for viscous neutrals, blended oils, and steam refined products, according to the Western Petroleum Association in its report on operations of 13 midwestern refiners.

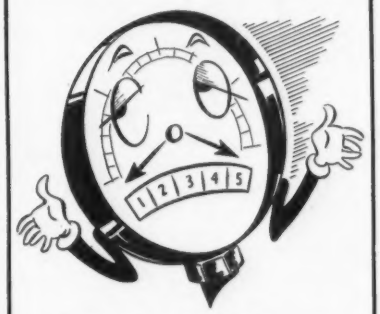
Production of bright stock for April averaged 10,106 bbl. daily as compared to the daily average of 10,085 bbl. for the previous month. Paraffin oils, which was the only lube not showing an increase in March, showed an increase of 733 bbl. daily during April, with an average production of 3,835 bbl. daily.

Steam refined stock dropped from 1,092 bbl. daily during March to 683 bbl. daily for April. A drop in production from 18,312 bbl. to 18,291 bbl. daily was reported for blended oils.

Detergent Unit Is Being Built by Shell Chemical

The first unit for making oil-derived synthetic detergents is under construction by Shell Chemical Corp. at Wood River, Ill., it was announced recently by W. P. Gage, vice president.

The new unit, which will manufacture an intermediate chemical used in making finished detergents, represents part of an investment of more than $9,000,000 that Shell companies have made in expansion and improvement programs in the St. Louis area during the past 2 years. Raw materials for processing will be received



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from the Shell refinery in Wood River.

Now in the planning stage are a new marine terminal in St. Louis and a large crude-oil tank farm at Wood River.

Shell Chemical is a subsidiary of Shell Oil Co., Inc.

Gulf, Koppers Combine Research Efforts

PITTSBURGH.—Signing of an agreement to pool efforts and facilities for research in converting coal to gaseous and liquid hydrocarbons has been announced by Sidney A. Swensrud, president of Gulf Oil Corp., and Gen. Brehon Somervell, president of Koppers Co. of Pittsburgh, in a joint statement of the move. Work on this cooperative program has begun.

Each company has been studying intensively the problem of liquefying gas and solid fuels. Gulf has been carrying on experimental work by its Research & Development Corp., under Dr. Paul D. Foote, its executive vice president, at the Harmarville, Pa., laboratories, the extensive Gulf research center. Various phases of the problem of synthesis of hydrocarbons are also being studied in other Gulf laboratories.

Koppers Co. under the directorship of Fred Denig, research vice president, has been active for many years in coal technology; several patents covering production of synthesis gas, charge "stock" for hydrocarbon synthesis, from solid fuels, have been obtained by Koppers. Gulf also has developed a group of patents and applications in the same field, dealing with converting natural and refinery gases to liquid fuels. Koppers is under contract to build and is building the $4,500,000 pilot plant for the Government at Louisiana, Mo., which will operate on the Fischer-Tropsch synthesis process. This appears to be an agreement similar to that entered into by Standard Oil Development Co. and Consolidation Coal Co. of Pittsburgh more than a year ago for research cooperatively on conversion of coal to liquid hydrocarbons; a pilot plant is under construction near Pittsburgh to carry out this work for Standard and Consolidation.

Car Registrations Up

NEW YORK.—Car registrations in 1947 reached the all-time high of 37,402,230 vehicles, the Public Roads Administration states, as reproduced by the American Petroleum Institute. This represents an increase of 10.2 per cent over 1946 registrations, and 22 per cent above the figures for 1945. Increase during the 2 years postwar period has been 6,800,000 vehicles, 5,000,000 being passenger cars and the remainder trucks and buses.

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PIPE LINES

Texas Eastern Expansion Approved; Work Begun

WORK has begun on the installation of additional compressors aggregating 86,400 hp., according to R. H. Hargrove, president of Texas Eastern Transmission Corp. The company has been granted a temporary certificate by the Federal Power Commission to construct facilities to increase delivery capacity of the Big Inch and Little Big Inch pipe lines to 508,000,000 cu. ft. per day by the beginning of 1949. This represents an increase of 75,000,000 cu. ft. over the delivery rate originally planned.

The additional compressors will be apportioned among the 21 existing stations. According to the application a total of 239,900 hp. is to be installed by 1949. Of this amount, 73,900 hp. will be allocated to seven reciprocal compressor stations, and the balance in 14 centrifugal compressor stations of a new type pioneered by the company.

Texas Eastern will buy casinghead gas at the combined rate of 55,000,000 cu. ft. daily from three Texas fields. They are Silsbee, in Hardin County; Turtle Bay, in Chambers County; and Hastings, in Brazoria County.

Immediate construction of three new gathering lines is planned by Texas Eastern. Twenty miles of 8-in. pipe line will be built from the company's existing line in Harris County, Texas, to the Stanolind Oil & Gas Co. gasoline extraction plant in Hastings field. At the same time in Louisiana two 10-in. lines, one 5 miles, and the other 2 miles long, will be laid from the Little Big Inch line to new gasoline extraction plants being built by California Co. and Southwest Gas Producing Co. in Hico-Knowles field.

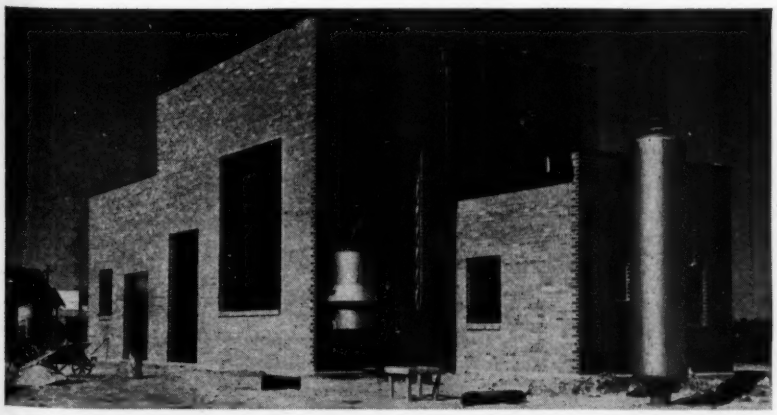
Another 10-in. pipe-line extension, running 17.2 miles from the Little Big Inch to Silsbee field in Texas, will be started during the last quarter of 1948.

Total capital cost of the company's pipe-line system is expected to be brought to about $182,700,000 through addition of the new facilities. This is approximately $10,300,000 more than the over-all capital cost of the Inch Lines system at the originally planned delivery of 433,000,000 cu. ft. daily.

Last week the Federal Power Commission dismissed an application filed by Texas Eastern for authority to remove portions of the Big and Little Inch pipe lines for use in completing lines in the Philadelphia area. The commission said that the company's gas transmission property and removal of such lines was not subject to the provisions of the Natural Gas Act. The order leaves Texas Eastern free to proceed on its own and carry cut the pipe removal and construction as planned.

Cities Service to Boost Compressor Capacities

Construction is now under way to increase compressor station capacity on the Cities Service Gas Co.'s pipe line serving central Kansas and Superior, Neb. Two 170-hp. gas-driven



An unusual type of architecture gives a modernistic touch to this pump station building under construction to house an electric centrifugal unit for Sunray Oil Co.'s 96-mile, 6-in., Allen-Duncan products line

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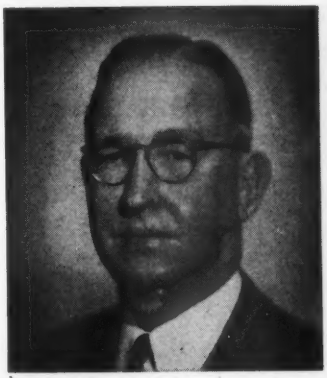
Men Behind the Job
who get the Job Done



This is Thomas R. Jones, top man in Oklahoma Contracting. His life's business has been devoted to specializing in pipe line construction, which includes laying of thousands upon thousands of miles of pipe line. Known for over 30 years in the industry for his ability to get the job done and his old-fashioned honesty.

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booster engines at the Lyons, Kans., compressor station are now being installed to bring total capacity at that station to approximately 900 hp.

The second installation will be 2 miles east of Ellsworth, Kans., and will include two more 170-hp. booster engines. Completion of both jobs is scheduled by August.

Court Upholds FPC on Michigan-Wisconsin Line

THE much litigated project to supply additional natural gas to the Detroit area won a court victory last week when the Circuit Court of Appeals for the District of Columbia upheld a 1946 decision of the Federal Power Commission granting a construction certificate to Michigan-Wisconsin Pipe Line Co.

The project calls for a pipe line from Hansford County, Texas, to the Austin storage field in Michigan with a branch line through northern Illinois into Wisconsin. The company is affiliated with Michigan Consolidated Gas Co., which distributes gas in the Detroit area, and which now obtains most of its gas from Panhandle Eastern Pipe Line Co.

The FPC decision was by a three-to-two vote, with a minority agreeing with Panhandle that its "grandfather" rights gave it the Detroit market exclusively since Panhandle was serving this area before the federal Natural Gas Act was passed.

Panhandle fought the Michigan-Wisconsin project on many points before the commission and the courts, and once before took the case to the court of appeals only to have it returned to FPC on a legal technicality. Meanwhile construction has started on the new line, though there is still litigation over the validity of contracts to purchase gas in Panhandle field.

Trans-Continental Group Meet to Discuss Plans

HOUSTON.—A meeting of stockholders of Trans-Continental Gas Pipe Line Co. which recently received Federal Power Commission authorization for a Texas-New York gas line *(The Oil and Gas Journal, June 3, page 36)*, was scheduled for June 9 in New York to discuss financing, construction, and other matters.

Claude A. Williams, Trans-Continental president, said it would probably take about 30 days to get the new organization operating. The 1,800-mile, 26-in. line will originate near Mercedes, Tex., in the Rio Grande Valley. Much of the gas to be moved by the new line will be sold to manufactured gas companies in the New

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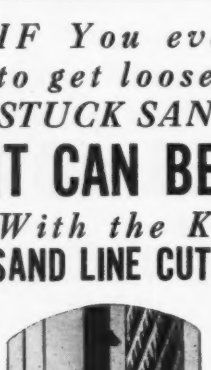

Enlarged drawing of section of tool inside tubing, showing tapered wedge forcing knife thru wire line

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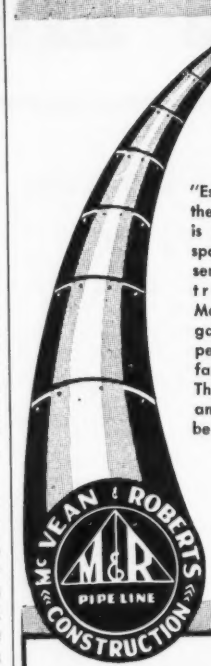

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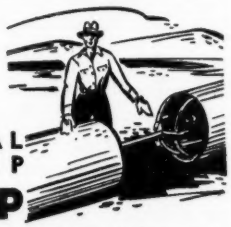

INTERNAL LINE-UP CLAMP

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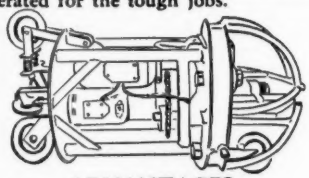

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Sinclair Products Line Begins Operations

Movement of products into the new Sinclair Refining Co. pipe line extending from the Houston refinery through Bryan and Waco to Arlington, Tex., with spurs to Fort Worth and Dallas, began early this week.

The line with a capacity of approximately 25,000 bbl. daily will ship gasoline, kerosine, heating oil and diesel oil. Approximately 140,000 bbl. of products will be required to fill the line.

The portion of the line northward from Arlington to St. Louis and to the company's refinery at East Chicago is still under construction and is expected to be completed some time this year.

El Paso Natural Plans Line to Serve One Well

Plans are under way by El Paso Natural Gas Co. to construct a 125-mile line from Jal, N. M., to the C. W. Chancellor and Slick Oil Co. No. 1 Davis gas-distillate producer in northern Pecos County of West Texas. The line will tie in with the company's trunk-line system from Jal to Blythe, Calif. The proposed line is expected to be completed in 18 months.

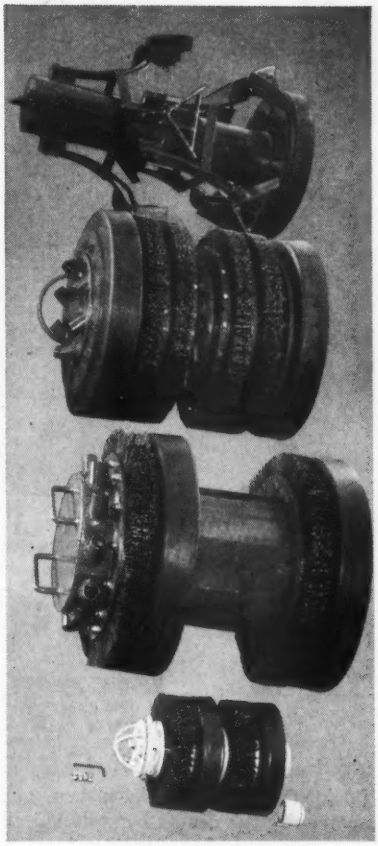
The well was completed several months ago to flow 6,400,000 cu. ft. of gas and 185 bbl. of 62°-gravity condensate gasoline daily.

El Paso Natural has signed a 20-year contract with the operators of the well for a minimum of 25,000,000 cu. ft. of gas weekly. The company will pay 7½ cents per 1,000 cu. ft. for the first 5 years; 8½ cents for the next 5 years; 9½ cents for the third 5-year period, and 10½ cents for the fourth 5-year period.

First Pipe Arrives for Ulysses-Hutchinson Line

The first shipments of pipe totaling 54 miles were delivered in May at Ryus, Copeland, Montezuma, and Ensign, Kans., for the construction of Cities Service Gas Co.'s 26-in., 182-mile natural-gas line between Ulysses and Hutchinson, Kans. Midwestern Constructors, Inc., started construction on the northern section several weeks ago.

Ray L. Smith & Son, Inc., El Dorado, Kans., contracting firm, has moved crew headquarters and equipment to Montezuma to start fabrication of meter and main-line gate settings and drips. Actual construction of the line is expected to begin this month with completion scheduled by December.



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- (3rd) **Type RCN** Pig with single row of rotation nozzles; new compact design for traversing long-radius factory ells. Light weight construction.
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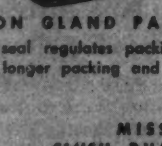

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Exploration and Drilling

Geophysics and the Surveying Problem

SURVEYING becomes more of a bottleneck each month to the geophysicist. His main objective is to make measurements of physical properties of the earth at various points and spot these observation points on a map, where accurate reference ties can be made to property boundaries.

As of today, the geophysicist finds himself in a strange predicament. The more he improves his geophysical instruments and speeds them up, the more he finds himself entangled in surveying problems that slow him up. He has instruments for making a quick reconnaissance of the physical properties of the earth over large areas. But it sometimes seems to him that improvements in geophysical instruments come in arithmetic progression, but bring with them land-surveying problems that increase in geometric progression.

The fastest instrument now in use is the airborne magnetometer; next comes the gravity meter. With the magnetometer in a plane, given favorable weather, an area of 200 to 400 sq. miles can be covered in a working day. But if the magnetic survey is to cover a large area of poorly mapped territory, Shoran radar must be used to take care of the land-surveying problem. A typical setup for such an operation involves a total of 27 people, of whom 14 are concerned almost solely with the Shoran surveying. Although the over-all cost per acre checked is still very low, the proportion of the expense chargeable to land surveying is very high.

A gravity-meter party, including the permit man, will consist of 8 to 10 men, of whom 4 to 6 will be in land-surveying crews. Under extremely favorable conditions, gravity observations can be made so rapidly and ground covered so fast that it will require eight men surveying to keep up with gravity meter. Again the principle comes into effect, the faster the geophysical instrument covers ground, the higher the percentage of total cost that is due to land surveying.

With the seismograph, under ordinary conditions, the land-surveying problem does not seem to bulk so large, although it is still important and the cost fairly substantial. This is because the seismograph is a detailing instrument, covering a small geographical area. But here, too, as work speeds up in the geophysical observations, the land surveying becomes more of a problem. In the newer techniques of refraction shooting, it is a substantial factor. In offshore work, improvements in operating techniques of the seismic observations now makes it possible to cover more ground in less time over water than on land. But surveying becomes progressively more difficult, and the faster the seismic observations are made, the more rapidly the surveying problems pyramid.

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

CALIFORNIA.—In Monterey County, Jergins Oil Co. and North American Consolidated Oil Co. encountered good oil sand at their 5-12 Orradre, follow-up to the companies' recent gas strike, supporting the theory that the discovery had encountered the gas cap of possibly the largest oil field in the Salinas Valley area. Richfield Oil Corp. continues to core and drill ahead at the 1 Russell, Santa Barbara County wildcat which rumors credit with being the outstanding discovery of the past 2 years.

ROCKY MOUNTAIN AREA.—The Barnsdall Oil Co. and Sohio Oil Co. tested 2,400 ft. of black oil on a 1-hour test of the Madison at the 1 Fox, Sage Creek, Big Horn County, Wyoming. At Northwest Elk Basin, Montana, Sinclair Wyoming Oil Co. found a new pay in the Lakota when its 2 Wilkins flowed 30 bbl. of oil per hour. It is reported, but not confirmed, that Western Natural Gas et al have tested gas at the rate of 10,000,000 cu. ft. daily at the 1 Navajo, wildcat in Boundary Butte, Utah.

NORTH TEXAS.—New Ellenburger production 1½ miles northeast of Continental Oil Co.'s refinery in southern Wichita County was indicated at the company's 1 Hausler, when it recovered 1,770 ft. of clean oil on a drill-stem test at 5,686-5,704 ft. A. L. Andree 1 Bransford, Eastland County wildcat 5 miles southwest of Eastland township, reported blowing wild and making a good flow of oil from what is thought to be the Caddo.

WEST TEXAS.—Additional Marble Falls production is indicated at Guiberson 1 Lassiter, 2½ miles southwest of the Arledge field in Coke County. Shamrock Oil & Gas Corp. 1 Wendland, new Ellenburger strike in the southeastern part of the county, flowed more than 250 bbl. of oil per day.

TEXAS GULF COAST.—In Liberty County, L. M. Josey et al 6 Mitchell Est. has been completed as a 290-bbl. discovery of a new producing horizon for the South Liberty dome. A new pay was found near the Dayton dome in the same county by Texas Co. 2 Deering, flowing gas and condensate from 7,550-54 ft.

SOUTHWEST TEXAS.—Cam Corp. 3 Olson, new gas pool opener in Duval County, flowed approximately 3,300,000 cu. ft. of gas per day from 3,004-12 ft.

CALIFORNIA

Good Oil Sand Tapped In New Gas Field

LOS ANGELES.—Jergins Oil Co. and North American Consolidated Oil Co. have topped excellent oil sand in their 5-12 Orradre, 12-23s-10e, in the Salinas Valley area of Monterey County, according to recent field reports. This venture, a follow-up well to the 1 Orradre, which was completed as a gas well 2 weeks ago, is reported to have topped a gas sand at 2,060 ft. This sand continued down to 2,080 ft. where it graded into a very good-looking oil sand. To the present depth of 2,160 ft., about 80 ft. of oil sand have been cored. Operators currently are running a formation test in order to decide whether or not to carry the hole deeper.

When the 1 Orradre was completed as a gas discovery 2 weeks ago, geologists familiar with the Salinas Valley advanced the theory that the well had struck the gas cap of what might become the largest oil field in the area. On the basis of this theory, Jergins and North American moved a short distance to the south to drill the 5-12 Orradre. Findings to date in this second venture would tend to support the theory, and operators hope that this well can be completed as an oil well. At the present time there is only one oil field in Monterey County. This is the San Ardo field, a three-well field discovered by The Texas Co. last October. The wells in this field have been relatively small, producing from 60 to 80 bbl. daily initially. However, its discovery was a shot in the arm for operators interested in the area, for up to that time more than 60 wildcats had been drilled in the Salinas Valley without a single showing of importance.

The Mayflower Oil Co. announced that it has encountered heavy, coarse oil sand at 2,639 ft. in its 1 J. O. L., 23-25s-27e, in the Jasmine area of Kern County. So far 15 ft. of the oil sand has been drilled, and the well has been stopped to set casing. It is located on a block of 320 acres which lies about 2,000 ft. east of seven pumping wells. However, the new prospective find is believed to be on a separate structure from the pumping wells. A formation test is scheduled to take place within the next few days. The 1 J. O. L. is the first drilling venture of the Mayflower Oil Co., and a successful discovery here would probably establish the company as one of the first in this area to find production on its first attempt.

While Richfield Oil Corp. continues to core and drill ahead near the 4,000-ft. mark in its Cuyama Valley wildcat in Santa Barbara County, the 1 Russell, 5-10n-27w, rumors continue to grow steadily that the well is the outstanding discovery of the past 2 years. No official reports on the well have been released nor has there been any confirmation of the rumors, but field scouts report that a recent formation test showed this well capable of producing as high as 1,400 bbl. daily. So far there is only one producing well in the Cuyama Valley. This is a discovery completed by the Norris Oil Co. in January of this year for approximately 265 bbl. daily. All attempts to offset this discovery have ended in failure.

CALIFORNIA SUCCESSFUL WILDCATS

Kern County, Wheeler Ridge area: Richfield Oil Corp. 71-29 Coal Canyon, 21-11n-20w, pumped 23 bbl. per day, gravity 23.8°, water cut 2.5 per cent, elev. 1,240 ft., TD 1,016 ft.

Richfield Oil Corp. 72-29 Coal Canyon, 21-11n-20w, pumped 9 bbl. per hour, gravity 23.4°, water cut 3.0 per cent, elev. 1,227 ft., TD 1,176 ft.

CALIFORNIA WILDCAT FAILURES

Kern County, Mountain View area: Richfield Oil Corp. F-1 KCL, 16-30s-28e, dry, elev. 378 ft., Santa Margarita 5,908 ft., Carbonaceous silt 5,980 ft., TD 6,146 ft.

The Texas Co. 1 Hogan-C.C.M.O., 4-31s-29e, dry, elev. 449 ft., TD 7,551 ft.

North Kern Front area: Oceanic Oil Co. 78 Del Rey, 35-27s-27e, dry, elev. 755 ft., TD 1,453 ft.

San Emidgio area: Continental Oil Co. L-2 K.C.L., 8-11n-21w, dry, elev. 627 ft., cherty shale 11,390 ft., tight oil sand 12,155 ft., oil sand 12,242 ft., TD 13,175 ft.

Los Angeles County, East Los Angeles area: Richfield Oil Corp. 1-1B Los Angeles River Comm., 34-1s-13w, dry, elev. 248 ft., TD 4,414 ft.

Santa Barbara County, Capitan area: Rothschild Oil Co. 1 Carega, 36-5n-31w, dry, elev. 280 ft., flowed water and some gas, TD 3,900 ft.

Cuyama Valley area: New Barmore 1 Woods, 9-10n-28w, dry, elev. 2,380 ft., TD 3,025 ft.

N. CENTRAL TEXAS

Schlittler Caddo Field Extended Over County Line

WICHITA FALLS.—The Schlittler Caddo field of southeastern Throckmorton County was extended into Young County by American Republics Corp. 1 Roy B. Jones, Block 1,648, TE&L Survey, which flowed 254 bbl. of oil a day from open hole at 3,761-3,829 ft. The well was running a high gas-oil ratio of around 13,000 cu. ft., and operators were attempting to lower the gas before making completion tests.

Continental Oil Co. 1-A Edwards, Clay County semiwildcat in Block 3,210, TE&L Survey, 3 miles southwest of Buffalo Springs, ran a 1-hour drill-stem test of the Caddo from 5,722-72 ft. Gas came to the surface in 26 minutes, and recovery was 450 ft. of oil and gas-cut mud, plus 120 ft. of drilling water. Top of the Caddo was 5,711 ft. Operators were drilling ahead below 5,900 ft., toward the Ellenburger.

In Montague County, Continental Oil Co. 1 J. S. Woods, F. J. Bellows Survey, 2 miles northwest of the town of Montague, and north offset to Continental and Sinclair's 1 W. T. Minor, flowed 133 bbl. of oil in the last 3 hours of a 6-hour test, to give it a daily potential of 1,104 bbl. Perforations are in the Bend conglomerate between 6,198-6,208 ft. The test flow was through 32/64-in. choke and gravity of the oil was 42°. British-American Oil Production Co. 1 A. A. Smith, prospective pumping discovery 6 miles northeast of Weinert in Haskell County, was waiting on pumping unit after swabbing an estimated 20 bbl. of oil and 10 bbl. of salt water per day. Perforations are in the Marble Falls conglomerate from 5,583-92 ft. Drill-stem tests, while drilling, showed prospects of better production, and operators were of the opinion at least part of the pay section had been cemented off.

In Montague County, Petroleum Investment Co. 18 Church Rolls, John Chambliss Survey, considered a wildcat in the Nocona area, pumped 50 bbl. of oil in the first 14 hours and 29 bbl. of oil in the next 24 hours from Newblock sand at 840-845 ft., total depth.

In Wilbarger County, 3 miles northeast of Fargo, S. D., Johnson et al 1-A Porter-Ayres ran electric log to 5,874 ft., then ran a 90-minute test from 5,856-74 ft. The recovery was 2,700 ft. of gas, 110 ft. of oil and gas-cut mud. Bottom-hole pressure rose to 1,500 psi. in 20 minutes. Drilling continued below 6,778 ft.

Kingwood Oil Co. 1 Garrett, Wise County outpost 4 miles northwest of Chico, drilled broken conglomerate from 5,373-5,400 ft., total depth, ran electrical log and shut down for orders. In drilling ahead below 5,320 ft., more pay was found, which was expected to cut down the excessive gas-oil ratio. A drill-stem test from 5,331-70 ft., open 90 minutes, recovered 3,100 ft. of oil-cut mud, on a flowing pressure of 1,700 psi. With packer at 5,331 ft., it flowed 30.25 bbl. of oil the first hour, and 24.75 bbl. the second hour, both on ¾-in. choke; then 16.5 bbl. oil the third hour through ½-in. choke, and the same amount the fourth hour. Gas-oil ratio was not specified.

NORTH CENTRAL TEXAS (DISTRICTS 9 & 7-B) SUCCESSFUL WILDCATS

Archer County: R. C. Lipscomb 2 Snider, Sec. 2,601, TE&L Sur., 7 mi. SW Windthorst, pumped 46 bbl. of 39.6°-gravity oil a day, sand 2,430-36 ft., TD.

Brown County: W. C. Estes et al 1 R. E. Blair, Blk. 17, Jessee Dickinson Sur., 2 mi. N May, flowed 70 bbl. of 42°-gravity oil a day, 24/64-in. choke, tubing pressure 50 psi., GOR 1,314 cu. ft., Marble Falls 2,872-92 ft., TD 3,508 ft.

Clay County: Bridwell Oil Co. 1-A Edrington, Grassmyer Sur., 4 mi. S Thornberry, estimated 1,500,000 cu. ft. gas, sand 1,291-1,306 ft., TD 2,184 ft., PB 1,355 ft.

Palo Pinto County: Crader Oil Co. 2 E. P. Costello, M. Castleman Sur., 3 mi. NW Pickwick, flowed 4,500,000 cu. ft. gas, sand 2,287-2,300 ft., TD, shutin pressure 1,000 psi.

Shackelford County: M. J. Mitchell 1 T. C. Partney, Sec. 17, BAL Sur., 2 mi. S Albany, flowed 232 bbl. of 43°-gravity oil in 20 hours, 1/16-in. choke, casing pressure 860 psi., tubing 480 psi., GOR 744 cu. ft., perforated 4,322-32 ft., TD 4,620 ft.

Stephens County: Kadane-Griffith Oil Co. 1 G. DeLoffose, Sec. 9, T&PRR Sur., 11 mi. E Albany, flowed 130 bbl. of 42.6°-gravity oil in 4 hours, 8/64-in. choke, casing pressure 200 psi., tubing 440 psi., GOR 482 cu. ft., top Ellenburger 4,453 ft., saturation 4,456-69 ft., TD 4,473 ft.

The Texas Co. 1 A. M. Moon, Sec. 1,306, TE&L Sur., 8 mi. NE Breckenridge, flowed 11,000,000 cu. ft. gas a day, shut-in pressure 1,583 psi., perforated 4,130-60 ft., top Marble Falls 3,924 ft., TD 4,876 ft.

NORTH CENTRAL TEXAS (DISTRICTS 9 & 7-B) WILDCAT FAILURES

Archer County: Fain McGaha 1 C. K. Garvey, Jos Levins Sur., 7 mi. SE Archer City, dry, TD 4,850 ft., Caddo 4,747 ft.

G. E. Kadane & Sons 1 W. S. Ikard, Sec. 1,870, TE&L Sur., 7 mi. SW Windthorst, dry, TD 3,243 ft.

Callahan County: Star Oil Co. 1 Josie Brown, Sec. 2, Blk. 2, BBB&CRR Sur., 6 mi. S Clyde, dry, TD 4,519 ft., Caddo 3,937 ft., Mississippi 4,434 ft.

Coleman County: H. F. Pettigrew 1 T. J. Hudson, Sec. 74, Blk. 2, GH&H Sur., 2½ mi. NE Novice, dry, TD 3,714 ft., Morris sand 3,234 ft.

Comanche County: F. F. Earles 1 Lee Brewer, Sec. 23, HT&B Sur., 3½ mi. SE Blanket, dry, TD 1,127 ft.

Cooke County: Bert Broday 1 L. B. Holland, J. Bolin Sur., 3½ mi. N Era, dry, TD 1,592 ft., Ellenburger 1,492 ft.

Kay Kimbell 1 A. Fields, A. C. C. Bailey Sur., 2 mi. E Gainesville, dry, TD 2,503 ft.

Palo Pinto County: Star Oil Co. 1 W. A. Pickard, J. Kracher Sur., 5 mi. NW Pickwick, dry, TD 2,758 ft., Strawn sand 2,772 ft., with oil show.

Throckmorton County: Konrad Sztykgold 4 R. H. King, Sec. 3, AB&M Sur., 8 mi. N Throckmorton, dry, TD 5,168 ft., Palo Pinto 3,154 ft., Caddo 4,530 ft., Mississippi 5,101 ft.

Wichita County: Bond Oil Corp. et al 1 H. R. Voelcher, Blk. 11, League 2, Denton CSL, 7 mi. SW Wichita Falls, dry, TD 5,536 ft., KMA lime 4,237 ft., Hull-Silk sand 4,464 ft., Vogtsberger 4,749 ft., Caddo 5,162 ft., Barnett shale 5,248 ft., Ellenburger 5,435 ft.

Wilbarger County: Humble Oil & Refining Co. 1 L. A. Roberson, Sec. 111, Blk. 14, H&TC Sur., 2½ mi. SE Lockett, dry, TD 3,585 ft., sand with oil show 3,438-50 ft., top lime 3,550 ft.

CANADIAN FIELDS

Pipe Line Throughput Aids Efforts to Control Wild Well

CHATHAM.—Progress is being made by the Alberta Conservation Board in controlling the Atlantic 3 wild well in Leduc field. The flow through well-head and craters has dropped considerably from the peak of 10,000 bbl. daily. Around 150,000 bbl. cleared from sumps and craters have been delivered through the Imperial pipe line to railhead at Nisku. Deliveries through the pipe line have been as high as 12,842 bbl. a day, with average of 12,000 bbl. Substantial quantities of oil have also been returned to the formation through Atlantic 1 well.

In the effort to control and temporarily cut off the flow from Atlantic 3, water under heavy pressure is being pumped into Imperial 48, ¼ mile west, at 1,200 to 1,500 bbl. an hour. This apparently has some effect in reducing the flow of the wild well. Two relief directional wells, designed to tap the D-3 zone in Atlantic 3 a few feet off bottom, are drilling. No. 1, 760 ft. west, is below 550 ft. and No. 2, 700 ft. south, is below 525 ft., both with surface casing set. They are planned to draw off a substantial part of the oil and gas production. Water flooding of the well was delayed some days when surface floods from the North Saskatchewan River compelled temporary removal of the high pressure pumping equipment set up to force water into Imperial 48.

Chairman I. N. McKinnon of the Alberta Conservation Board reports the fire hazard greatly diminished through draining of oil from earthen pits and diked areas to a stage where the wellhead area is relatively free from static oil. Other wells in the field will, however, remain closed since the entire pipe line capacity is needed to handle the Atlantic 3 production.

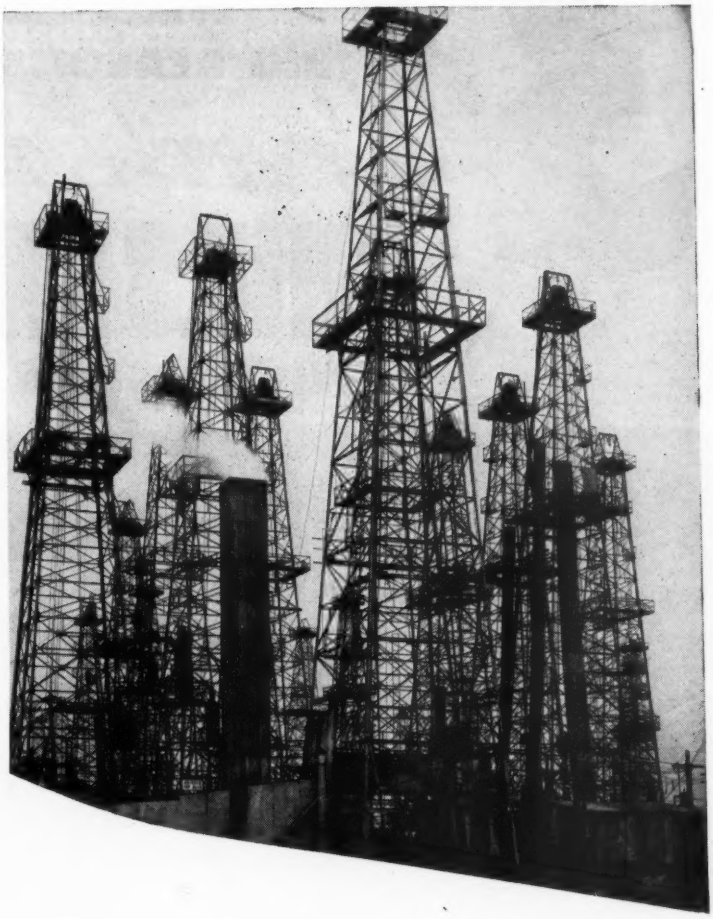
Leduc operations.—Both Imperial Oil and independent companies are steadily building up potential production against the time when the ban is lifted. Imperial wells now awaiting the establishing of initial potentials are No. 24, LSD 12, 35-50-26w4, swabbed into initial production at 5,102 ft.; Imperial 49, LSD 3, 28-50-26w4, swabbed in at 5,085 ft.; Imperial 53, LSD 9, 20-50-26w4, testing at 5,346 ft.; Imperial 57, LSD 15, 5-50-26w4, standing at 5,434 ft.; Imperial 60, LSD 11, 20-50-26w4, with circulation restored at 5,302 ft.; Imperial 61, LSD 14, 27-50-26w4, at 5,309 ft.; Imperial 59, LSD 6, 22-50-26w4, testing at 5,120 ft. Imperial has five other wells drilling, three preparing, and one shut down because of its proximity to Atlantic 3.

Northeast of the field on the Saskatchewan River, Co-Op Leduc 2, LSD 6, 35-50-26w4, an important outpost test, is below 4,543 ft. after proving the D-1 zone at 4,050 ft. Central Co-Op 3, LSD 12, 25-50-26w4, is nearing completion after topping the Devonian at 4,290 ft.

Globe-Leduc 5, LSD 16, 34-50-26w4, got the D-3 zone a few feet below the average water line at 5,160 ft. with drill-stem test of this zone yielding 150 ft. of oil and 440 ft. of oil-cut mud and water. Directional drilling toward the south will be undertaken to tap the oil zone above the water line.

Woodbend.—In the Woodbend extension, 3½ miles north and west of the Leduc field, Imperial-Woodbend 2, LSD 4, 15-51-26w4, finished at 5,301 ft., indicates a good producer. Imperial-Woodbend 3, LSD 9, 15-51-26w4, at 5,320 ft. has been swabbed and is waiting to go on production. Both were offsets to the No. 1 discovery well.

Calmar.—In the Calmar extension, Texaco-McColl-Calmar 1, LSD 6, 36-49-27w4, got initial gas shows in a drill-stem test at 5,249-59 ft. Test at 5,290-5,300 ft. showed 50,000 cu. ft. of gas with 160 ft. of oil and gas-cut mud and 500 ft. of salty sulfur water. Test is deepening below 5,500 ft. Lo-



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cation is south and west of Leduc production.

Lloydminster.—In the Lloydminster field, Hargal-Lignora 1, LSD 12, 14-50-2w4, at 1,993 ft., has pumping production of 70 bbl. Imperial-H. B. Blackfoot 2, LSD 2, 23-50-2w4, at 1,964 ft., gave 60 bbl. on pump. Imperial-H. B. Blackfoot 3, LSD 1, 23-50-2w4, finished at 1,980 ft., is building a storage tank. Imperial 4, LSD 2, 23-50-2w4, is waiting at 1,982 ft. and Imperial 5, LSD 8, is cleaning at 1,968 ft. All are indicated good pumpers. Petromine 1, LSD 2, 14-50-2w4, finished at 1,275 ft., is waiting for pump. Petromine 2, same LSD, has spudded.

St. Ann.—Finding of oil with salt water in the D-1 zone in St. Ann 1, LSD 9, 28-55-4w5, on the Alexis reserve, will be followed by deepening to test the lower Devonian horizons, productive in the Leduc field. D-1 contact at St. Ann was between 400 and 500 ft. lower than in the Leduc field.

EASTERN TEXAS

Leon County Venture Cores Oil and Gas Shows

DALLAS.—Byrd-Frost, Inc., 1 J. L. Nash, A. C. Bullock Survey, 2½ miles south of Leona in Leon County, had shows of oil production, along with additional gas. Total depth is 7,755 ft., in hard, sandy shale, cored ahead to 7,777 ft. Cores from 7,590-7,600 ft. recovered 6 ft. of hard, black shale, with no shows. At 7,600-08 ft. there was black shale with streaks of sand, having light stains and odor in spots. A 9-ft. recovery from 7,608-18 ft. had streaks of sandy shale with slight gas odor in spots, and from 7,618-28 ft. there was black shale with no shows. At 7,761-71 ft., there was black, thin-bedded shale with very slight oil stain. When operators went into the hole again for another core below 7,771 ft., gas pocketed in the mud and produced a quantity of oil on the pit.

In Cass County, 1 mile west of Avinger, W. A. Patterson 1 J. C. Turner, reworked Woodbine test, reported corrected total depth at 4,286 ft. in Georgetown shale and lime. Corrected core report was 2 ft. of shaly lime, with no shows, at 4,135-41 ft.

Five miles southwest of Kosse, Falls County, Seaboard Oil Co. 1 J. E. Green had total depth at 5,309 ft. and prepared to drill ahead. Cores from 5,298-5,309 ft. recovered 1 ft. of hard limestone, having some porosity and faint odor. A drill-stem test of that interval, open 30 minutes, produced a maximum surface pressure of 95 psi. in 22 minutes and recovered 4,980 ft. of slightly gas-cut salt water. Flowing bottom-hole pressure was 1,025 psi.

W. B. Hinton 1 J. M. Criswell, Henderson County, had total depth at 8,745 ft. and prepared to run electric log. Sample top of the Pettit was placed at 8,673-77 ft. J. P. Owens et al 1 Mrs. W. F. DeArmon, Jose S. Cordova Survey, cored shaly lime with no shows to 7,522 ft., and was drilling below 7,492 ft. Sample tops placed the Paluxy sand at 6,024-50 ft. with no shows, upper Glen Rose 6,240-50 ft., first anhydrite stringer 7,159 ft. (by log), and anhydrite zone 7,125-55 ft.

EAST TEXAS (DISTRICTS 5 & 6) SUCCESSFUL WILDCAT

Panola County: G. J. Hollandsworth 1 Alice Crain, J. B. Sweeten Sur., A-622, 5 mi. NE Beckville, flowed estimated 36,000,000 cu. ft. gas a day, plus 32 bbl. 63.6°-gravity distillate per 1,000,000 cu. ft., lower Pettit perforated 6,538-50 ft., rock pressure 2,700 psi., TD 7,012 ft., elev. 310 ft.

EAST TEXAS (DISTRICTS 5 & 6) WILDCAT FAILURE

Grayson County: Farris Carter McCamey 1 Louis & Katherine Tschoepe, Peter Glass Sur., A-459, 3 mi. N Pilot Point,

dry, TD 2,533 ft., sand with oil show 2,477-82 ft.

Navarro County: L. T. Davis 1 fee, J. M. Steiner Sur., 5 mi. NW Corsicana, dry, TD 2,003 ft., Pecan 1,035 ft., base Austin 1,441 ft., top Woodbine 1,838 ft., Buda 1,985 ft.

SOUTH LOUISIANA

Offshore Prospect Continues to Test

NEW ORLEANS.—Magnolia Petroleum Co. 1 Ship Shoal Lease 766, on Block 72 prospective oil producer in the Gulf of Mexico, is continuing to test sands encountered before making a final completion. This well is located 8 miles south of Coon Pointe production, 11 miles off the Terrebonne Parish shore. On initial test through perforations at 6,885-88 ft., it flowed an estimated 1,260,000 cu. ft. of gas per day with 1,750 psi. flowing pressure. After flowing for some time, it started showing some 42°-gravity oil. These perforations were squeezed after the flow developed salt water along with the oil and another test will be made. The well previously indicated a gas producer in a lower sand, through perforations at 7,268-73 ft. Total depth is 9,355 ft. in salt, top of salt at 8,290 ft. The first tidelands oil discovery in the area was by Kerr-McGee Oil Industries and others, approximately 25 miles northwest of the Magnolia test. It found pay at 1,700 ft.

A new discovery of gas and condensate in the Cankton area of St. Landry Parish has been opened by Superior Oil Co. of California 1 Louis Savoie, 1½ miles south of Cankton field production and northeast of Boscoe field, Section 37-8s-3e. Drilled to a total depth of 11,024 ft., this well was plugged back and perforated from 10,550-560 ft. where it flowed an estimated 30 bbl. of condensate along with 3,800,000 cu. ft. of gas through a ¼-in. choke. Flowing pressure on tubing was 3,800 psi. and shut in pressure was 4,550 psi. This well is producing from the lower Broussard sands which flow gas and condensate on the north side of the Cankton field.

Humble Oil & Refining Co. is making a test in a fractured salt zone in its salt dome discovery 8½ miles off Grand Isle, Jefferson Parish. The 1 State Lease 801, Grand Isle, in the Gulf of Mexico, topped salt at 7,607 ft., total depth 8,600 ft. in salt. The 7-in. casing is set at 7,827 ft. and perforated from 7,650-7,740 ft. in the salt which is fractured in that section and bleeding oil. Tubing was run to 7,596 ft. and the well was swabbing oil and wash water at last report. Sands showing oil were encountered from 7,094-7,106 ft. Operators will plug back for a test of these sands if the deeper test is a failure.

The 19 new locations reported included 6 wildcat starts, 2 in Plaquemines Parish, and 1 each in Beauregard, Lafourche, St. Mary and Vernon Parishes. Two successful wildcats were completed, one each in Plaquemines and St. Martin parishes, and two were dry, one each in Acadia and St. Landry parishes.

SOUTH LOUISIANA SUCCESSFUL WILDCATS

Plaquemines Parish: New gas-condensate discovery, Pointe a La Hache—S. W. Richardson E-4 Delacroix Corp., 34-16s-14e, TD 11,313 ft., top sand 10,196 ft., perf. 10,196-207 ft., IP: 44 bbl. condensate per day and 4,350,000 cu. ft. gas per day through a 3/16-in. choke, gas-condensate ratio 53,400, TP 3,950 psi., SIP 4,000 psi., grav. 53.8°, no water.

St. Martin Parish: New deep oil sand, Lake Mongoulois—The Texas Co. 8 State-Lake Mongoulois State Lease 303, 4-10s-9e, TD 11,093 ft. in sidetracked hole, perf. 10,968-11,008 ft., IP: 209 bbl. oil per day through a 10/64-in. choke, GOR 592, TP 1,000 psi., grav. 25.8°, no water.

SOUTH LOUISIANA WILDCAT FAILURES

Acadia Parish: Nelson Bunker Hunt Tr. Est. 1 Stella Freeland, 27-9s-1w, Egan area, dry, TD 11,201 ft.

St. Landry Parish: Hunt Oil Co. 1 G. H. & B. C. Woodruff, Plaisange Prospect, 109-5s-3e, 7 mi. NW of Opelousas townsite, dry, TD 10,203 ft.

APPALACHIAN FIELD

West Virginia's New Pool Continues Rapid Expansion

PITTSBURGH.—Near the town of Silverton, in Ravenswood district, Jackson County, West Virginia, four good oil wells were completed in a rich Berea local pool now being very closely drilled. Heater & Nichols completed No. 1 M. C. White for 50 bbl. a day from a total depth of 2,133 ft.; Kentucky Oil & Gas Co. completed No. 1 Etta Moore for 65 bbl., total depth 2,143 ft.; K. M. Hunt completed No. 1 Shirley McMurray for 30 bbl., total depth 2,112 ft.; Spartan Gas Co. completed No. 1 Julia Clayton for 50 bbl., total depth 2,112 ft. As yet, there are no indications of a directional trend, if any. The new pool is being serviced by tank trucks.

In Lincoln district, Wayne County, the wildcat of United Fuel Gas Co., the No. 6,181 F. D. Caldwell, topped the St. Peter at 7,085 ft. from a surface elevation of 688 ft. There was a showing of 18,000 cu. ft. of gas at 7,160-62 ft., and a showing of oil at 7,170-71 ft.

On Briery anticline in Portland district, Preston County, Snee, Eberly et al logged the top of the Clinton formation at 8,087 ft. in the wildcat on the Virginia Cuppet farm and are drilling at 8,340 ft.

In Logan district, Logan County, Columbian Carbon Co. completed another good well at 1,058 Island Creek Coal Co. with 3,860,000 cu. ft. of gas; it logged the Big lime at 1,394 ft.; shot at 2,180-2,210 ft.; total depth is 2,204 ft.

In Oceana district, Wyoming County, Hope Natural Gas Co. completed two additional wells on Loup Creek Colliery Co.: No. 9,141, good for 1,848,000 cu. ft. of gas after shooting the Ravencliff sand at 1,829-50 ft., with total depth of 1,866 ft.; and No. 9,214, good for 552,000 cu. ft. of gas after shooting the lower Maxton sand at 2,532-42 ft., with total depth 2,540 ft.

On Chestnut Ridge in Springhill Township, Fayette County, southwest Pennsylvania, New Penn Development Co. et al bottomed the wildcat on the J. R. Smiley farm at 8,104 ft. as dry in the Oriskany sand which was topped at 7,936 ft. The Onondaga chert was marked at 7,795 ft.

New locations for the week totaled five: in Kiskminitas and Valley townships, Armstrong County, and Allen and West Bethlehem townships, Washington County.

WEST VIRGINIA SUCCESSFUL WILDCATS

Wyoming County: Oceana district: Godfrey L. Cabot, Inc., 1,272 Golda Haynes, 1,-679,000 cu. ft. gas, Maxton sand 1,940 ft., gas 1,966 ft., rock pressure 530 psi. 12 hours, TD 1,966 ft.

Godfrey L. Cabot, Inc., 1,263 W. H. Walker, 4,000,000 cu. ft. gas, Maxton sand 2,225-73 ft., Big lime 2,412 ft., acidized, TD 2,850 ft.

WEST VIRGINIA WILDCAT FAILURES

Logan County, Logan district: W. W. Cunningham 1 Jackson Estate, dry, Berea, TD 2,807 ft.

Roane County, Harper district: Myron D.

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West 1 Myrtle Romine, dry, Salt sand, TD 1,652 ft.

ROCKY MOUNTAIN

Barnsdall and Sohio Strike Madison Pay

DENVER.—A discovery of black oil in the Madison formation has been made by Barnsdall Oil Co. and Sohio Oil Co. in the Sage Creek area, Big Horn County, Wyoming, at the 1 Fox, C SE SW 6-57n-97w. The well topped the Madison at 3,139 ft. and on drill-stem test at 3,413-30 ft. the operator recovered 630 ft. of oil and 30 ft. of oil-cut mud in 15 minutes. On another test at 3,428-45 ft., the well made 2,400 ft. of oil and 15 ft. of oil-cut mud in 1 hour. Flowing pressure on the latter test was 1,175 psi., with shutin pressure 1,725 psi. The oil is 14.5° gravity and showed some water cut. At 3,450 ft., total depth, the operator is running casing to complete. The Sage Creek structure is southeast of the Frannie field, which lies along the Montana-Wyoming state line. The structure has had previous tests, including one to the Madison. However, the operators reworked the structure with seismograph prior to locating the present well. The Madison is productive in the Frannie and Elk Basin fields, as well as other structures in the Big Horn Basin in Wyoming.

Water was tested in the second Wall Creek by Continental Oil Co. in the interesting Taylor-Sussex wildcat, north of the Salt Creek field in Johnson County, Wyoming. The well is 1 Alice Coles, NW NW SE 17-42n-78w, and top of the second Wall Creek sand, productive in the Salt Creek field, was found at 6,717 ft. At 6,750 ft., total depth, the well tested 930 ft. of water in 30 minutes. Because the well had been running higher than expected it was hoped that the Wall Creek formation might be productive. The operator is continuing to drill and will probably test Sundance before completion of the well.

Discovery of oil in a new producing formation for Northwest Elk Basin, Montana, has been made by Sinclair Wyoming Oil Co. at the 2 H. G. Wilkins, SW NW NW 28-9s-23e. The well is now at 4,676 ft., total depth, and on drill-stem test at 4,593-4,676 ft. flowed 15 bbl. of oil in 29 minutes on a 45-minute test. The well made gas in 2 minutes and gaged 537,000 cu. ft. in 16 minutes. Oil started flowing in 16 minutes and the well is estimated good for 30 bbl. of oil per hour from this zone. Top of the Lakota was found at approximately 4,500 ft. and the first test in this formation showed at the rate of 5 bbl. of oil hourly. This is the first oil production in the Lakota formation at Northwest Elk Basin and wells higher structurally tested sweet gas from this zone. It is indicated that there is an oil ring at the base of the gas on this sand.

Tests of the important Boundary Butte wildcat at 1 Navajo, C NE NW 22-43s-22e, San Juan County, Utah, by Western Natural Gas Co., Byrd-Frost, Inc., and Paul B. English are reported to have established the well as a commercial gas discovery. No official release of tests and formation tops have been made by the operators but rumors from Durango indicate the well is good for 10,000,000 cu. ft. of gas daily following acidizing. Production is believed to be coming through casing perforations at around 5,400 ft. These operators drilled the well to 6,090 ft., total depth, with the last top reported as Hermosa at 3,800 ft. Shows of gas have been encountered in several zones in the well.

New operations. — Twenty new locations were made with 12 of these in Wyoming, 6 in Montana and 2 in Colorado. One of the Colorado locations is Texas Co.'s second wildcat on the 54,000-acre unitized North Douglas Creek block in Rio Blanco County between the Rangely and Douglas Creek fields. The well is located in the NE SE SE 32-1s-101w, 3 miles north of a dry hole drilled by the company last year. In Petroleum County, Montana, British American Oil Producing Co. has announced location for the 1 fee, NW SE NW 25-17n-24e, a wildcat test of the Box Elder structure, 28 miles northwest of the West Dome at Cat Creek. Pacific Western Oil Co. has made location at 1 State, SE SW NW 16-39n-61w, Niobrara County, Wyoming, in the Bridge Creek area, for an interesting wildcat test. Other new operations are for pool wells.

Completions. — Twenty-two wells were completed in the Rocky Mountains for an initial of 2,139 bbl. of oil daily. Twelve of the wells were in Wyoming, five in Montana, four in Colorado and one in Utah. The Utah completion was Pacific Western Oil Co.'s important Gordon Creek wildcat in Carbon County, which established a depth record for the state. The well was completed by the company as a carbon dioxide discovery in the Shinarump formation at 10,980 ft., total depth. On tests the well made between 8 and 10 million cubic feet of gas with an extremely high carbon dioxide content. Pacific Western has announced plans for construction of a plant at Price, Utah, for manufacture of dry ice from the carbon dioxide gas. This well was originally drilled to 12,146 ft., total depth, in the Coconino formation and found carbon dioxide gas in that formation. The operator was unable to recover fish lost in the hole and plugged back to 7,880 ft. where whipstock was set for redrilling to present total depth.

WYOMING WILDCAT FAILURE

Niobrara County, West Mule Creek: Pepper & Barnett S-3 Unit, C SL SW SE 35-40n-61w, dry, TD 2,983 ft. (OWDD, OTD 2,630 ft.), Bell sand 2,877 ft., Pahasapa 2,885 ft., water 2,883 ft.

UTAH SUCCESSFUL WILDCAT

Carbon County, Gordon Creek: Pacific Western 1 Unit, C SE NE 24-14s-7e, 8,-

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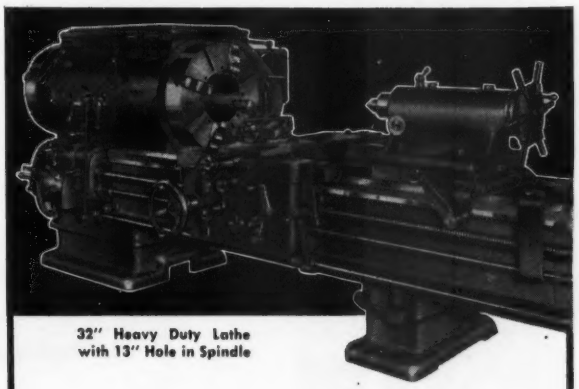

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LA.-ARK.

Bienville Parish Test Runs Electric Logs

SHREVEPORT.—Union Producing Co. and Pure Oil Co. 1 Nebo, Bienville Parish wildcat in 30-14n-5w, ran electrical surveys to total depth of 10,008 ft., then spotted cement plug at 8,760 ft. The hole was washed down and firm cement found at 8,693 ft. After conditioning the hole, the first drill-stem test was made in the Pettit at 8,654-8,693 ft. Using ¼-in. chokes and open 15 minutes, it produced a slight blow and recovered 540 ft. of mud, with no shows. A second plug-back was made to 6,460 ft. to test the Rodessa between 6,434-64 ft., as shown by electric log.

In Caddo Parish, 2½ miles north of the Caddo field in 4-22n-15w, Chicago Corp. and L. E. Parker 1 Ledbetter was coring at 5,686 ft. in the Pettit, near its projected new total depth of 6,000 ft. Cores at 5,595-5,625 ft. recovered 25 ft. of hard, dense tight limestone with slight porosity and bleeding oil. A drill-stem test between 5,613-25 ft., open 45 minutes, recovered 15 ft. of mud with no shows. Twenty feet of cores recovered from 5,625-48 ft. were the same as above, and a drill-stem test of the interval, open 45 minutes, recovered 90 ft. of mud, and 195 ft. of mud cut with salt water.

Kerr-McGee and E. E. Hurley 1 Frost, 14-11n-15w, 4 miles west of the Spider field in De Soto Parish, was swabbing salt water with an undisclosed amount of oil, from the Pettit. At total depth of 6,492 ft., it was swabbed dry and all perforations squeezed. New holes at 6,093-6,104 ft. and 6,125-49 ft., swabbed salt water and oil. There was no change in recovery from further perforations between 6,185-92 and 6,260-66 ft. Kerr-McGee Oil Industries, Inc., 1 Nabors-Rives Unit, 1½ miles south of Mansfield, was drilling at 3,925 ft. in Glen Rose.

Skelly Oil Co.'s 1 W. H. Nunley Unit, 8-12n-16w, prospective north extension to the Logansport field, De Soto Parish, ran a 1-hour test from 5,136-54 ft., which recovered 30 ft. of gas-cut mud. A second test at 5,899-5,917 ft., open 20 minutes, recovered 30 ft. of mud with no shows. Drilling continued below 6,021 ft., in the lower Glen Rose.

Roy L. Fisher et al 1 B. W. Marston, a new test northeast of the Lamar field in 14-16n-9e, was drilling at 4,560 ft. in the Tuscaloosa. Tentative sample top on the Marine Tuscaloosa was 4,269 ft. In Lincoln Parish, Carter Oil Co. 1 Martin Matthews, 22-18n-4w, had total depth at 10,380 ft. in the Cotton Valley and was reaming down to core ahead. A drill-stem test from 10,075-10,380 ft., using ¼-in. chokes and 6,000 ft. of water cushion, recovered the water and 25 ft. of mud with slight show of gas in 1 hour and 15 minutes.

In Columbia County, Arkansas, H. L. Hunt 1 D. W. Elledge, 15-15s-21w, was nearing its planned total depth of 6,300 ft. in the Cotton Valley at 6,003 ft. There was no official word on the formation being drilled. McAlester Fuel Co. 1-A W. D. Black, 24-15s-21w, was drilling in the lower Glen Rose at 3,737 ft.

In Grant County, Joe W. Kimzey et al 1 Grace Jones, 31-4s-15w, is a new wildcat, which has drilling under way. Contract depth is 3,500 ft. Ten miles north of Pine Bluff, Jefferson County, F. H. Carpenter 1 A. C. McGregor, 9-4s-9w, was spudded in for a 3,600-ft. test. In Miller County, Carter Oil Co. 1 H. H. Gildon, 22-16s-27w, was drilling below 7,822 ft.

In Ouachita County, J. S. Slack et al 1

J. Dean, 16-14s-19w, was drilling below 1,240 ft. It is a new test northeast of the Stephens field. Proposed depth is 3,600 ft. In Union County, E. G. Bradham 1 Hartje, 17-16s-14w, was drilling ahead below 1,654 ft. It is a 5,000-ft. Smackover test. C. A. Kinard 1 Scales, 3-18s-17w, was below 5,137 ft. in Travis Peak. Simon, Erwin & Johnson 1 A. Hearin, 19-18s-14w, was drilling at 1,586 ft.

Sohio Petroleum Co. 1 Schilling, 12-16s-17w, Union County, had no shows on a drill-stem test between 6,133-25 ft., where cores showed oolitic lime with spotted stains and slight odor. It was coring the Buckner at 6,125 ft.

NORTH LOUISIANA WILDCAT FAILURES

Richland Parish: J. K. Wadley 1 W. C. Chennault, NE SW 2-16n-6e, dry, TD 5,141 ft., no details available.

Tensas Parish: J. D. Trimble & E. P. Watts 1 Trimble-Mabray-Somerset, 37-14n-12e, dry, TD 8,518 ft.

TEXAS GULF COAST

New Producing Zones Found in Two Domes

HOUSTON.—The best well to date on the northeast flank of the South Liberty dome in Liberty County has been completed at Lenoir M. Josey et al 6 Joseph Mitchell Estate. This well was completed in the Cook Mountain formation, opening another new producing sand for this portion of the dome. Total depth is 6,606 ft., and pipe was perforated from 6,291-6,321 ft. for completion. On potential gage, the well flowed 290 bbl. of 38.8°-gravity oil per day through a ⅛-in. choke with 1,600 psi. flowing pressure on the tubing and 1,650 psi. pressure on the casing. Materials are being moved to the 7 Mitchell location which will be north and a little west of the No. 6 producer.

The Texas Co. 2 John A. Deering, wildcat exploration off the southeast flank of the Dayton dome in Liberty County, is being completed as a discovery in new deep gas and condensate sands. Total depth is 8,131 ft., with 5½-in. casing cemented at 8,108 ft. and perforated from 7,550-54 ft. where it flowed gas and condensate with 1,500 psi. pressure, on a drill-stem test. Tubing has been run for completion. This well is located in H. & T. C. Survey, Section 134, Abstract 44.

L. D. Cain 1 M. J. Maroney, has opened a new gas pool approximately 1 mile northeast of the Bloomington field, 1½ miles southwest of the Placedo field, in southeastern Victoria County. Total depth is 5,063 ft. in Frio sand. Pipe was set to 4,740 ft., and perforated at 4,670-72 ft. where it tested gas with a spray of oil or condensate. Operators squeezed, then made final completion at 4,670 ft. as a gas well. No details were available on the gage. This well is located on the common line between Pat Hughes Survey A-461 and S.A.&M.G. RR Survey, A-402, in the south corner of Lot 101, Henderson & Pickering Subdivision.

Taylor Refining Co. 1 Hanselmann, new gas well completed recently approximately 1½ miles northwest of the Marcado Creek gas field, 8 miles east of Victoria, and 2½ miles southwest of Telferner in Victoria County, is waiting on potential gage. Perforations are at 4,678-74 ft., and total depth in sidetracked hole is 4,743 ft., with 5½-in. casing on bottom. The well showed 1,875 psi. tubing pressure and 1,900 psi. casing pressure while flowing through a 3/16-in. choke. It is located in Lot 102 of the Allison-Richey Land Co. Subdivision, in the Chas. Creanor Survey, A-173.

The Hope gas field in Lavaca County has been extended 1 mile west by Shell Oil Co. 1 Yoakum State Bank. On potential test, it gaged 73 bbl. of condensate per day through a 9/16-in. choke, with tubing pres-

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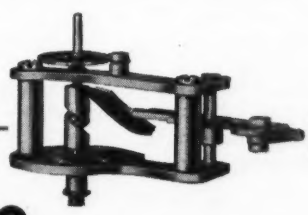

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sure of 700 psi., and casing pressure 950 psi., gas-oil ratio 26,300. Total depth is 7,782 ft., and perforations are at 7,712-28 ft. This well is located in Wm. Mimms Survey, A-325, 1¼ miles southwest of Hope townsite.

The 47 new locations reported this week included 12 wildcat starts, 2 each in Live Oak and Refugio counties, and 1 each in Brazoria, Calhoun, Fayette, Karnes, Matagorda, Victoria, Wharton and Wilson counties. Four successful exploratory tests were completed, two in Goliad County, and one each in Gonzales and Liberty counties. There were 10 wildcat failures, 2 each in Matagorda and Refugio counties, and 1 each in Brazoria, Fayette, Lee, Polk, Victoria and Wharton counties.

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TEXAS GULF COAST (DISTRICTS 2 & 3) SUCCESSFUL WILDCATS

Goliad County: New oil discovery, La Bahia—Overtoon Refg. Co., Inc., 1 S. E. Cole, 1½ mi. S of Goliad and just SW of La Bahia, top pay 5,548 ft., TD 5,566 ft., open hole 5,550-66 ft., IP: 4 bbl. oil per day through ¼-in. choke, GOR 21,950, TP 150 psi., CP 390 psi., grav. 41.7°, no water.

New oil and gas discovery, "Weesatche townsite"—W. L. Goldston et al 1 August F. Gottschalt, in Alfred Berry Sur. A-59, and 1,800 ft. N of "10-mile Coletto Creek," ¼ mi. E of Weesatche townsite, 2½ mi. SW of Brandt field, 2⅛ mi. W-SW of Weser field, 4⅛ mi. E of Slick-Wilcox field, dual completion; top pay 7,601 ft., Luling sand, TD 8,100 ft., perf. 7,606-12 ft., IP: 8,000,000 cu. ft. gas per day on open flow, with condensate, shutin pressure 2,300 psi., no water; top pay 7,676 ft., perf. 7,676-82 ft., IP: 138 bbl. oil per day through a ⅛-in. choke, GOR 2,740, TP 1,300 psi., casing sealed, grav. 34.7°, no water.

Gonzales County: Extension, Arnim area—Phillips Petroleum Co. 1 Lilly Brown, near Fayette County line, 4 mi. E of Waelder, Adam Zumwalt League, A-86, ⅔ mi. SW of Arnim field, top pay 2,070 ft., TD 3,230 ft., perf. 2,070-81 ft., IP: 16 bbl. oil per day on jet, TP 35 psi., CP 620 psi., no water.

Liberty County: New oil sand, South Liberty—Lenoir M. Josey et al 6 Jos. Mitchell Est., A. G. White Sur., TD 6,606 ft., top sand 6,290 ft., Cook Mountain, perf. 6,291-6,321 ft., IP: 290 bbl. oil per day through a ⅛-in. choke, GOR 710, TP 1,600 psi., CP 1,650 psi., grav. 38.8°, no water.

TEXAS GULF COAST (DISTRICTS 2 & 3) WILDCAT FAILURES

Brazoria County: Baldridge & King et al 1 Continental Oil Co., E. S. Jones Sur., 1 mi. off SE flank of Old Damon Mound, dry, TD 4,581 ft.

Fayette County: H. W. Little 1 E. Kruschel, A. Walker Sur., 4 mi. SW of West Point townsite, dry, TD 1,763 ft.

Lee County: Taylor Refg. Co. 1 Ruth Rivers Millner, Ira Clemons Sur., 3 mi. NW of Lexington townsite, dry, TD 3,463 ft.

Matagorda County: H. A. Potter 2 Henry T. Freeman, Thos. McCoy & D. Decker Sur., A-60, ¼ mi. N of Sargent townsite, dry, TD 6,938 ft.

Union Producing Co. 1 S. L. Pinckney, Johnson, Walker & Borden League, A-54, 6,750 ft. E of Sugar Valley south extension production, dry, TD 11,015 ft.

Polk County: Woodley Pet. Co. & Delta Drlg. Co. 1 J. H. Edmonds, Wm. Pace Sur., A-60, 9,000 ft. W of Goodrich field production, 1 mi. NE of Goodrich townsite, dry, TD 8,535 ft..

Refugio County: Hewit & Dougherty G-1 F. B. Rooke & Sons, La Rosa Ranch Subd. "B," Blk. 10, ½ mi. SE of Roche field, 4 mi. SW of Woodsboro, dry, TD 7,025 ft.

P. R. Rutherford 4 James F. Welder Heirs, A. B. Pedigo Sur. 1, 7 mi. W-NW of Vidauri, dry, TD 6,253 ft.

Victoria County: Rock Hill Oil Co. 1 O. G. Beall, J. Kerr Heirs Sur., 4 mi. NW of Placedo, 3 mi. NE of Dacosta, dry, TD 5,251 ft.

Wharton County: Magnolia Pet. Co. 1 Hudgins Estate, John C. Clark Sur., A-13, 2½ mi. SW of Spanish Camp gas production, dry, TD 4,002 ft.

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MICHIGAN

New Oceana County Pool Gets Confirmation Well

SAGINAW.—A second producing completion ¼ mile southeast of the discovery well indicated a likely new field in Weare Township of Oceana County. The new well, second in 3 weeks, is the Roosevelt Oil Co. 1 Leone McMillen in Section 6. Acidized in the Dundee at 2,092 ft., it was producing 90 bbl. a day. The discovery was reported still making 85 bbl. daily. A third well is being drilled in the area and two other locations have been planned, to be drilled by Carter Oil Co.

The brisk pace in Michigan continued in the past week as a total of 30 locations in 17 counties were announced and 15 operations were completed, 5 being oil wells, 1 a gas producer and the others dry holes, of which 4 were wildcats. The producers included a 35-bbl. Allegan County well, a 140-bbl. completion in Bay County, a 12-bbl. well in Arbela field of Tuscola County and a 30-bbl. Van Buren County well. The new locations were in the following counties: one each in Shiawassee, Midland, Mecosta, Berrien, Missaukee, Roscommon, Gladwin, Barry, Huron, Newaygo, Bay, Crawford and Tuscola, two in Oceana, four in Van Buren, five in Allegan, six in Clare.

The Michigan Oil and Gas Association reported the state's daily crude oil production increased 755 bbl. in the past month to 43,755 bbl. from 3,492 wells.

MICHIGAN SUCCESSFUL WILDCAT

Oceana County: Weare Township: Roosevelt Oil Co. 1 Leone McMillen, SW NW NW 6-16n-17w, acidized for 90 bbl. in Dundee, TD 2,092 ft.

MICHIGAN WILDCAT FAILURES

Allegan County, Allegan Township: Cook Drilling Co. 1 Rich Harnden, SE SE NW 7-2n-13w, dry in Traverse lime, TD 1,479 ft.

Wayland Township: Leonard C. Sleep 1 M. Chlebana, NW SW SW 36-3n-11w, dry in Traverse lime, TD 1,841 ft.

Mecosta County, Austin Township: Michigan Consolidated Gas Co. 1 State-Stump, SW NE NE 20-14n-9w, dry, TD 1,376 ft.

Newaygo County, Monroe Township: Oil Producers, Inc., 1 Ralph Schooley, NW NW NE 11-15n-12w, dry, TD 772 ft.

SOUTHWEST TEXAS

Cam Corporation Opens New Gas Pool

CORPUS CHRISTI.—A new gas pool approximately 5 miles northwest of Hebbronville and 5 miles south-southeast of the Cam field, Duval County, has been opened by Cam Corp. 3 G. N. Olson. Drilled to a total depth of 3,038 ft., it flowed an estimated 3,300,000 cu. ft. of gas per day on open flow, through perforations at 3,004-12 ft. in gas sand. The 5½-in. casing is set on bottom. The well is located in Share 4, El Mesquite Grant.

Union Producing Co. 8 C. P. Talbert, in the Agua Dulce field, Nueces County, has been worked over and recompleted for an oil well in a new pay zone. Through perforations at 6,585-95 ft., it flowed 89.7 bbl. of net oil per day through a 9/32-in. choke, plus 38 per cent salt water, with 175 psi. tubing pressure and 1,050 psi. casing pressure. Gas-oil ratio is 1,207 and gravity is 40.6°. Total depth is 6,977 ft. with top of the new pay zone at 6,585 ft. This well is located in Block 6, Section 5, R. Peters Subdivision 2.

The Texas Co. 1 Duval County Ranch Co., NCT 49, wildcat test 1 mile west of the Yegua field of North Government Wells, in northwestern Duval County, pumped approximately 8 bbl. of 24°-gravity oil per day on production test through perforations at 1,800-10 ft. Initial pumping test produced 27 bbl. of oil in 17½ hours, but the production declined after that. Total depth is 2,912 ft. This well is located in the southeast corner of Narcisco Hernandez Survey 54, 4½ miles northwest of Freer.

A new sand for the northeast extension area of Agua Dulce field, Nueces County, has been opened at Seaboard Oil Co. 3 J. C. Robertson, in Block 5, Partition of Wright lands. Total depth is 6,516 ft. and operators are preparing to complete in the 6,500-ft. sand which indicated production on drill-stem test at 6,505-11 ft. This test was made through ¼-in. chokes and developed 163 psi. working pressure in 10 minutes, flowed oil, and recovered 900 ft. of oil with no water.

The 28 new locations reported for Districts 1 and 4 included 12 wildcat starts, 4 in Duval County, 2 in Webb County, and 1 each in Bastrop, Brooks, Medina, San Patricio, Starr and Williamson counties. Two successful wildcats opened a gas pool in Duval County and an oil field in Kleberg County. There were 11 wildcat failures, 3 in Webb County, and 1 each in Atascosa, Cameron, Dimmit, Duval, Jim Hogg, Kleberg, Nueces, and Zapata counties.

SOUTHWEST TEXAS (DISTRICTS 1 & 4) SUCCESSFUL WILDCATS

Duval County: New gas pool—Cam Corp. 3 G. N. Olson, El Mesquite Gr., 5 mi. NW of Hebbronville and approx. 5 mi. S-SE of Cam field, top pay 3,004 ft., TD 3,038 ft., perf. 3,004-12 ft., IP: 3,300,000 cu. ft. gas per day on open flow, shutin pressure 1,050 psi., no water.

Kleberg County: New oil field, "West Borregas"—Humble Oil & Refg. Co. MC-1 King Ranch-West Borregas, Santa Gertrudis Gr., 11½ mi. W-NW of Kingsville & 4½ mi. NW of Borregas field, top pay 5,952 ft., TD 7,047 ft., perf. 5,960-64 ft., IP: 11 bbl. oil per day through 3/32-in. choke, GOR 29,600, TP 1,600 psi., casing sealed, grav. 40.2°, 40 per cent water.

SOUTHWEST TEXAS (DISTRICTS 1 & 4) WILDCAT FAILURES

Atascosa County: Rudco Oil & Gas Co. & Billy Bridewell 1 M. L. Leveridge, Fab-

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ricus Reynolds Sur., Abst. 719, 6 mi. NW of Charlotte, dry, TD 5,856 ft.

Cameron County: James E. Kemp 1 Ruth M. Wassell et al, La Feria Gr., 2½ mi. SW of Santa Rosa, dry, TD 8,032 ft.

Dimmit County: E. Cockrell & Continental Oil Co. 1 O. C. Rogers, I&GN Sur., Blk. 2, 4 mi. SE of Big Wells, dry, TD 6,183 ft.

Duval County: Charles Snellstrom et al 1 Miller Ranch, Palo Blanquito Gr., 3 mi. NW of Realitos, dry, TD 5,610 ft.

Jim Hogg County: F. P. Schwab et al 1 John H. Allen, H&GN RR Sur. 29, 20 mi. SW of Hebbronville, dry, TD 3,661 ft.

Kleberg County: Humble Oil & Refg. Co. T-3 King Ranch-Stratton, Santa Gertrudis Gr., Stratton area, dry, TD 7,600 ft.

Nueces County: The Atlantic Refg. Co. 1 O. W. Emken, Sec. 65, Geo. H. Paul's Subd. of Driscoll Ranch, J. V. L de Herrera Gr., 1¾ mi. NW of North Minnie Bock field, dry, TD 8,955 ft.

Webb County: Gordon W. Johnson 1 Grant Adami, Sur. 340, 1½ mi. SW of Adami field, dry, TD 1,025 ft.

Gordon W. Johnson 1 K. E. Paysinger, Ernest C. Gasser Sur. 260, 3 mi. W of Carolina-Texas field, dry, TD 2,366 ft.

W. C. McBride, Inc., & Mid-Continent Pet. Corp. 1 J. M. Martin, Sur. 87, 12¾ mi. NE of Palafox and 15 mi. W of Cactus in NW cor. of county, dry, TD 4,021 ft.

Zapata County: H. V. Drilling Co. 1 fee, Villa Gr., 6½ mi. S of Escobas, dry, TD

MISSISSIPPI

Baxterville Field Gets Two Producers

JACKSON.—Gulf Refining Co.-Welch 1 Howard-Bass Unit, Section 18-1n-16w, in Baxterville field of Lamar County, flowed 79 bbl. of 15.8°-gravity oil per day on initial production test. Total depth is 8,839 ft., with perforations for completion at 8,731-36 ft., 8,701-20 ft., and 8,611-17 ft. The 5½-in. casing was cemented at 8,853 ft.

Also in Baxterville field, Sun Oil Co. 3 J. S. Moody, Section 31-2n-16w, was completed for an initial production of 390 bbl. on pump per day, through perforations at 8,854-73 ft. Total depth is 8,878 ft.

Gulf 2 George F. Taylor, 27-1n-12e, has been completed for an initial production of 116 bbl. on pump per day, gravity 17°, through perforations at 4,874-82 ft., 4,962-67 ft., 5,026-44 ft., and 5,070-80 ft. Total depth is 5,194 ft., with 7-in. casing cemented at 5,197 ft. Morrison "A" sand was topped at 4,875 ft., City Bank 4,964 ft., Stanley 5,027 ft.

At Hub field, Marion County, Humble Oil & Refining Co. 12 E. A. Ball, 20-2n-14e, was drilled to a total depth of 9,131 ft., and completed through perforations at 9,127-29 ft., flowing 99 bbl. of 32.2°-gravity oil per day through a 3/32-in. choke. Tubing pressure was 1,125 psi., GOR 375.

Danciger Oil & Refining Co. 1 Love Petroleum Co., 10-2n-13w, Forrest County, encountered cap rock at 1,705 ft., and salt at 1,934 ft. to discover another piercement salt dome. Sidewall cores at 1,605 ft., 1,614 ft., 1,615 ft. and 1,618 ft. recovered sand with asphaltic odor, but well has been completed as dry at total depth 1,950 ft. in salt.

One wildcat start was reported for Mississippi in Wayne County, while five development locations were shown, three in West Heidelberg field, Jasper County, and one each in Hub field, Marion County, La Grange field, Adams County, and Yellow Creek field, Wayne County. Three wildcat failures were reported, one each in Adams, Forrest and Scott counties.

MISSISSIPPI WILDCAT FAILURES

Adams County: Big Chief Drilling Co. 1 George Armstrong, 33-5n-2w, dry, TD

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6,628 ft., Wilcox 4,667 ft., first sand 4,692 ft.

Forrest County: Danciger Oil & Refg. Co. 1 Love Pet. Co., 10-2n-13w, dry, TD 1,950 ft. in salt, top salt 1,934 ft., top cap rock 1,705 ft.

Scott County: Continental Oil Co. 1 U.S.-D.A. (Beach), C SW SE 23-8n-6e, dry, TD 7,150 ft., Eutaw 5,274 ft., Tuscaloosa 5,927 ft., Marine Tuscaloosa 6,520 ft., base Marine Tuscaloosa 6,595 ft., Massive sand 6,646 ft., Lower Cretaceous 6,817 ft.

ALABAMA WILDCAT FAILURE

Crenshaw County: Nelson Exploration Co. 1 Smith Lumber Co., dry (OWDD, OTD 10,017 ft.) TD 10,830 ft., top Cotton Valley 6,460 ft.

OKLAHOMA

Logan County Wildcat Hits In Hunton

PRODUCTION from the Bois d'Arc section of the Hunton is indicated by results from drill-stem tests at L. C. Tharpe et al 1 A. L. Dodd, C NW NE 6-17n-4w, wildcat located near the west line of Logan County. The well had the Oswego lime at 5,920 ft. and the Mississippi lime at 6,330 ft. The Hunton was topped at 6,916 ft. with porosity at 6,922-42 ft. A drill-stem test at 6,924-85 ft., with tool open for 85 minutes, recovered 190 ft. of oil and gas-cut mud. Bottom-hole pressure was 450 lb. Casing has been set to 6,980 ft. for a production test.

Republic Natural Gas Co. has run casing at 1 Lovell Brothers Trust, SW SW NW 35-18n-3n, Payne County wildcat, following good shows on drill-stem tests of the Bartlesville topped at 3,934 ft. A 95-minute test at 3,934-45 ft. had gas in 7 minutes, estimated at 1,500,000 cu. ft. per day, and recovered 50 ft. of oil and 35 ft. of oil-cut mud. Cores from 3,945-50 ft. indicated additional good sand and a 55-minute test of the interval recovered 60 ft. of oil, 70 ft. of oil-cut mud, and 20 ft. of salt water.

Jordan Petroleum Co. 1 Cole, SW SW SW 9-15n-1e, offset to the discovery well in the East Evansville pool, is showing for a good producer. The offset well had the Bartlesville at 5,010 ft. and a drill-stem test at 4,788-5,022 ft., open for 15 minutes, had gas in 3 minutes and oil in 9 minutes, flowing at an estimated rate of 25 bbl. per hour. The discovery well, Jordan 1 Faver, SE SE SE 8-15n-1e, was completed with an initial production of 102 bbl. per day from the Bartlesville.

Phillips Petroleum Co. has opened a new producing zone at the northwest end of Knox field in Grady County at 1 Hutson, SE SW SW 31-4n-5w. A drill-stem test of sand at 5,693-5,723 ft., with tool open for 1 hour, had gas in 6 minutes and recovered 2,500 ft. of 40°-gravity oil and 210 ft. of gas-cut mud. The sand is Pennsylvanian and crew is drilling ahead below 5,845 ft.

OKLAHOMA SUCCESSFUL WILDCATS

Creek County: Extension to Bristow—Cushing 1 Spikes, NW NE SE 31-16n-9e, pumped 5 bbl. of oil per day from Dutcher topped at 3,254 ft., TD 3,267 ft.

Hughes County: New pay in Greasy Creek—Cities Service 1 Smith "B," NW SE SW 12-8n-10e, produced 1,100,000 cu. ft. of gas per day from Booch at 2,336-64 ft., TD 2,390 ft.

McClain County: Extension to Southeast Newcastle—Sells 1 Wiley, SE SW SE 30-9n-3w, flowed 200 bbl. of 41.2°-gravity oil per day from Bois d'Arc-Hunton at 8,820-80 ft., through 15/64-in. tubing choke, TD 8,919 ft.

Extension to Southeast Newcastle—Blackwell 1 Thomas, C NE NW 31-9n-3w, flowed 92 bbl. of 41.2°-gravity oil per day from Hunton at 8,975-90 ft., through 14/16-in. tubing choke, TD 9,058 ft.

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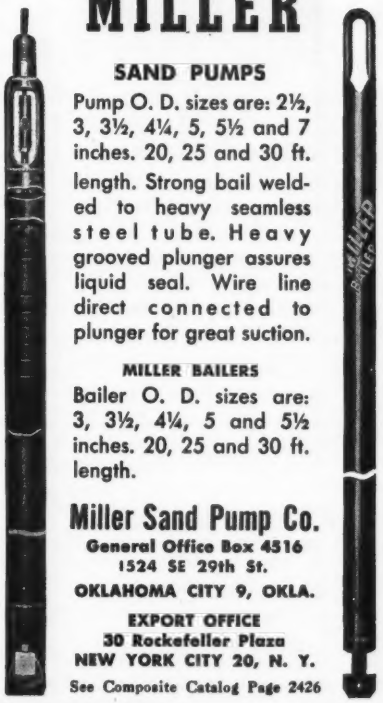

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OKLAHOMA WILDCAT FAILURES

Caddo County: Shell Oil Co. 1 Tsa-ah-sezah, C NW SE 30-6n-11w, dry, TD 8,200 ft., dolomite 2,707-25 ft.

Cotton County: Blair 1 School Land, NW NW SE 16-4s-10w, dry, TD 1,804 ft., Meargle 1,652 ft.

Conkling 1 Anderson, NE SE SW 17-4s-12w, dry, TD 1,608 ft., no log.

Kiowa County: Spradling 1 School Land, SE SW SW 13-7n-18w, dry, TD 1,299 ft., granite 1,297 ft.

Lincoln County: Gutowsky 1 Ward, NW SW SW 33-13n-6e, dry, TD 4,672 ft., Oswego 3,250 ft., Prue 3,270 ft., sand 3,385 ft., Verdigris 3,430 ft., Red Fork 3,610-40 ft., Mayes 4,110 ft., Hunton 4,370 ft., Sylvan 4,470 ft., Viola 4,555 ft., Wilcox 4,620 ft., second Wilcox 4,660 ft.

Waggoner 1 McGee, SW SW NE 35-14n-5e, dry, TD 4,957 ft., Hogshooter 2,180 ft., Checkerboard 2,545 ft., Oswego 3,410 ft., Prue 3,472-97 ft., no Skinner, Red Fork or Bartlesville, Mayes 4,395 ft., Woodford 4,565 ft., Hunton 4,630 ft., Sylvan 4,723 ft., Viola 4,810 ft., Wilcox 4,910-55 ft.

Logan County: McMahon 1 Michilson, SW SW SW 10-15n-1w, dry, TD 6,040 ft., Howard 2,453 ft., Pawhuska 2,637 ft., Tonkawa 3,408 ft., Avant 3,826 ft., Hogshooter 4,386 ft., Checkerboard 4,650 ft., Oswego 5,100 ft., Mississippi lime 5,452 ft., chat 5,479 ft., Hunton 5,589 ft., Sylvan 5,612 ft., Viola 5,710 ft., Wilcox 5,871 ft.

Payne County: Hall 1 Kirk, NW NW NW 18-17n-4e, dry, TD 4,000 ft., Layton 2,820 ft., Checkerboard 3,085 ft., conglomerate 3,130 ft., Big Lime-Oswego 3,562 ft., Prue 3,740 ft., Skinner 3,865 ft., Inola 3,890 ft., Bartlesville 3,917 ft., Bartlesville sand 3,960 ft.

Pontotoc County: Duncan 1 Reed, SW SE SW 3-4n-5e, dry, TD 2,300 ft., Haragan-Hunton 1,908 ft., Chimney Hill 1,978 ft., Sylvan 2,012 ft., Trenton 2,202 ft.

Stephens County: McCasland 1 Sisler, NW SW SW 8-1s-8w, dry, TD 2,691 ft., no tops reported.

Tillman County: Bridwell 1 Moser, SE NE SE 25-1s-19w, dry, TD 4,782 ft., Canyon lime 2,780 ft., Viola 4,065 ft., Simpson lime 4,250 ft., Arbuckle 4,650 ft.

OHIO, KENTUCKY

Six Locations Planned For Parma Area

COLUMBUS.—Six locations have been reported from the city of Parma, the first since the discovery well was completed earlier in the year, and all are within ½ mile of the discovery. Probably no more applications will be approved by the City Commission until permanent regulations for drilling have been agreed upon.

The Quaker State Oil 2 James Adrian, Section 11, Clayton Township, Perry County, was shot with 180 qt. and made better than 200 bbl. in the first 24 hours.

Woody Ditch et al 1 Renke-Hoffman, Section 17, Homer Township, Medina County, topped the Newburg at 2,470 ft. and is still in the sand with an estimated 1,500,000 cu. ft of gas and 20 bbl. of oil.

The Wheeling pool was extended ½ mile to the southwest by a small well, the Ohio Fuel 1 Shipley-Smith, Section 4, Knox Township, Guernsey County. Oriskany sand at 3,108-17 ft. gaged 219,000 cu. ft. of gas natural which will be shot.

The Chickasaw Oil & Gas 1 Eaf Miller, a semiwildcat in Section 7, Symmes Township, Lawrence County, topped the Clinton at 2,935 ft. which was very hard and showed 10,000 cu. ft of gas. The well will be drilled to the Medina and if no production is found, will be plugged back to the Clinton and shot.

Last week the Harry Kurchick 1 Emmett Will, Section 6, Chester Township, Meigs County, was reported as a ⅜-mile southwest extension. The completion should have been the 2 Emmett Will, a 500-ft. south extension.

New locations totaling 19 were scattered over the following 11 counties: Muskingum and Monroe 3 each, Medina, Tuscarawas, Noble, and Perry 2 each.

EASTERN KENTUCKY

ASHLAND.—Three completions were on record in the Eastern Kentucky field of operations during the past week. Kentucky-West Virginia Gas Co. completed Well No. 894, J. S. Cline property, Pike County, at 3,312 ft., for 119,000 cu. ft. of gas in shale, A. S.; Well No. 5,797, John W. Jones, Floyd County, at 3,253 ft., for 193,000 cu. ft. of gas in shale, A. S.; and Well No. 5,802, W. P. Owens, Knott County, 3,054 ft., for 119,000 cu. ft. of gas in shale, A. S.

WESTERN KENTUCKY

OWENSBORO.—I. B. Browning has completed 2 Oscar Snyder, 11-N-23, East Poole pool in Webster County, with an initial production of 45 bbl. per day from the Tar Springs at 1,887-1,900 ft.

In Henderson County, Ashland Oil & Refining Co. and Basin Drilling Co. 1 Eades and Holliday, NE NW NE 20-O-24, has been completed in the McClosky at 2,453-56 ft. for an initial production of 36 bbl. per day. Pay zone was treated with 2,000 gal. of acid. Total depth is 2,617 ft.

Hardin County has a 1,000-ft. wildcat test near Vine Grove, now drilling below 135 ft. The well, S. C. Yingling and D. E. Schock, is located SE SE NE 19-P-42.

INDIANA

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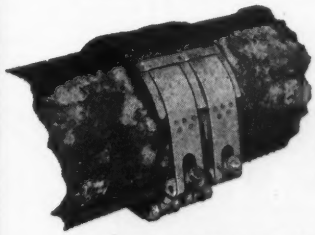

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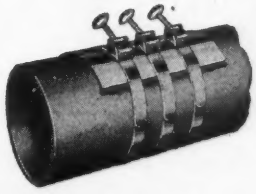

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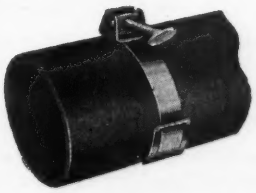

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Co. 1 Berry et al, NW SW NW 13-2s-13w, has the makings of an excellent pool opener. Operator is testing 57 ft. of saturated Waltersburg sand at 1,898-1,955 ft. and well is making 700 bbl. per day without being shot. Hole was carried to 2,767 ft. and plugged back to 1,960 ft. Nearest production is in East Keensburg pool, Wabash County, Illinois.

In Vanderburgh County, pipe has been set at Aurora Gasoline Co. 1 William Hoffman, NE NW NE 33-6s-11w, for a test of the O'Hara at 2,521-27 ft. A 2-hour drill-stem test at 2,510-31 ft. recovered 17 ft. of oil and 3 ft. of oil-cut mud. Well is about 2 miles southwest of Evansville and about 1½ miles east of Vernon Heights pool.

INDIANA WILDCAT FAILURES

Spencer County: John Unger et al 1 McDowell, NE NE NE 18-7s-7w, dry, TD 1,792 ft.

Vanderburgh County: Gulf Refining Co. 1 Mable Preston, SW NW NW 36-7s-11w, dry, TD 2,541 ft.

KANSAS

Edwards County Wildcat Is Producer

MAX COHEN has indications of good production at 1 Bright, NW NW SW 1-24s-16w, wildcat in the northeast corner of Edwards County. Arbuckle was topped at 3,952 ft. and Granite logged at 3,972 ft. Casing was set at 3,973 ft. and perforated with 60 holes at 3,936-60 ft. After an acid treatment, the well was swabbed for a short time and started to flow, spraying oil over the derrick. Some reports credit the gas and light oil production to Arbuckle while others say Granite wash. The oil is about 50°-55° gravity.

Stanolind Oil & Gas Co. 1 Bear, NW NW SE 17-32s-40w, Morton County, on the western edge of the Hugoton field, failed to find any important shows in the Mississippian and Arbuckle. Operator has perforated casing opposite the lower Pennsylvanian sand where gas production was indicated from an earlier drill-stem test. The sand was topped at 4,991 ft. and the 48 holes were made at 4,990-98 ft., resulting in 4,000,000 cu. ft. of gas.

In the northern part of Stafford County, J. M. Huber Corp. 1 Symns, NE NE SE 28-22s-14w, is a Kansas City lime producer. Early tests of the Arbuckle and sections of the Lansing-Kansas City made mostly water. The early perforations were cemented and the hole cleaned out. Pipe was then perforated with 24 holes at 3,696-3,704 ft., resulting in flow of about 24 bbl. per day natural. After treatment with 3,000 gal. of acid, the well flowed 145 bbl. in 11 hours and later swabbed 147 bbl. in 7 hours.

Tide Water Associated Oil Co. 3 Miskiman, NW NW SW 32-26s-12w, Pratt County, has been completed as a Simpson producer with a 3,000 bbl. bomb potential. Simpson was cut at 4,173 ft. and production is through casing perforations at 4,194-99 ft., 4,211-15 ft., and 4,221-32 ft. Well is located on the south side of the Carmi pool where production is from the Arbuckle except for one Lansing-Kansas City well and two Simpson wells, one a minimum producer and the other with a potential of 443 bbl.

In western Barber County, Bishop Oil Co. is drilling ahead in the Mississippian at 1 Davis, C NW 6-34s-14w, following gas shows. The Mississippian was topped at 4,853 ft. and shows of gas were recorded at 4,855-69 ft., 4,860-4,900 ft., and 4,900-25 ft. Well is 2 miles north of the Aetna gas pool.

For the week, a total of 59 new locations were reported. Barton County led with 14 followed by Rice County with 6 new drilling spots.

KANSAS SUCCESSFUL WILDCATS

Barber County: De Geer pool opener—Lion 1 De Geer, NE NE SW 2-33s-15w, flowed 359 bbl. of oil in 16 hours (initial potential 3,000 bbl. per day), from Viola topped at 5,146 ft., through 22/64-in. choke, gravity 41.8°, TD 5,434 ft.

Kearny County: Extension to Hugoton—Mid-Continent 1 Stewart, NW NW SE 29-24s-38w, produced 5,600,000 cu. ft. of gas per day from Herrington-Krider at 2,434-67 ft.; Ft. Riley 2,602 ft., TD 2,624 ft.

McPherson County: Ingling et al 1 Griffith, SW SW SW 33-19s-1w, produced 750,000 cu. ft. of gas per day from Mississippi lime topped at 2,949 ft., TD 3,011 ft.

Rice County: Extension to Bornholdt—Sheffer 1 Swanson, NE NE NW 12-20s-6w, produced 150 bbl. of oil per day from Mississippi lime topped at 3,290 ft.; lime 2,757 ft., TD 3,329 ft.

KANSAS WILDCAT FAILURES

Barton County: B & R Drilling 1 Dannebohm, NE NE SW 36-20s-12w, dry, TD 3,450 ft., Lansing-Kansas City 3,164 ft., Simpson 3,400 ft., Arbuckle 3,420 ft.

Butler County: Thrifty Oil Co. 1 Reder, SW SW SE 33-28s-6e, dry, TD 2,844 ft., Mississippi lime 2,820 ft., no Bartlesville.

Shell Oil Co. 1 Mueller, NW NW SE 35-25s-6e, dry, TD 2,768 ft., no tops reported.

Cowley County: Blair 1 DeVore, SW SW NW 10-33s-5e, dry, TD 3,252 ft., Mississippi lime 3,178 ft.

Ellis County: Derby Oil Co. et al 1 Dreiling, NE NE SW 3-12s-16w, dry, TD 3,385 ft., Sooy 3,320 ft., Simpson shale 3,359 ft., Arbuckle 3,367 ft.

Graham 1 Schmidt, NE NE SE 22-12s-17w, dry, TD 3,710 ft., Sooy 3,632 ft., Arbuckle 3,692 ft.

Ellsworth County: Westgate & Greenland 1 Dobrinsky, SE NW NE 16-17s-9w, dry, TD 3,035 ft., lime 2,911 ft.

Graham County: Stormfeldt 1 Sayers, NW NW NW 6-8s-21w, dry, TD 3,698 ft., Arbuckle 3,669 ft.

Marion County: El Dorado 1 Carpenter, SW SW NW 10-21s-4e, dry, TD 2,558 ft., Lansing 1,780 ft., Mississippi lime 2,305-

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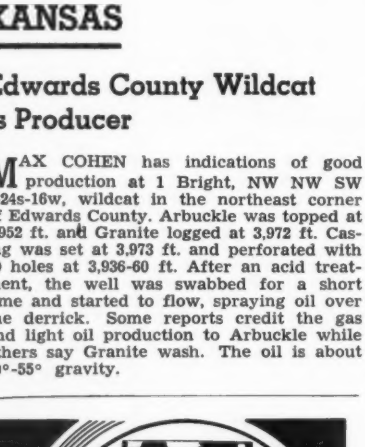

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Cedar Falls, Iowa

51 ft., Misener 2,540 ft., Hunton 2,542 ft.

Osborne County: Westgate & Greenland 1 McEwen, NW NW SE 27-8s-15w, dry, TD 3,861 ft., Arbuckle 3,826 ft.

Pawnee County: Mid-Continent 1 Redetzke, C WL SW SW 34-23s-15w, dry, TD 4,230 ft., Lansing-Kansas City 3,668 ft., Viola 4,023 ft., Simpson shale 4,116 ft., Arbuckle 4,174 ft.

Gabbert & Lindas 1 Fertig, NW NW NW 16-23s-17w, dry, TD 4,645 ft., Mississippi lime 4,290 ft., Misener 4,293 ft., sand 4,345 ft., Viola 4,383 ft., Arbuckle 4,547 ft.

Rice County: Lewis 1 Tyrrell, SW SW SW 36-21s-10w, dry, TD 3,594 ft., Viola 3,423 ft., Simpson 3,482 ft., Arbuckle 3,545 ft.

Stafford County: Gass 1 De Busk, SE SE NW 29-24s-14w, dry, TD 4,425 ft., Marmaton 4,050 ft., Sooy 4,130 ft., cherty Viola 4,229 ft., Simpson 4,325 ft., Arbuckle 4,369 ft.

Alpine et al 1 Stambaugh, SW SW NE 33-25s-15w, dry, TD 4,622 ft., Mississippi lime 4,349 ft., Viola 4,402 ft., Simpson 4,531 ft., Arbuckle 4,588 ft.

PERMIAN BASIN

New Marble Falls Pay Found in Coke County

MIDLAND.—Coke County had prospects of a second Marble Falls producing area, 2½ miles southwest of Sun Oil Co.'s Arledge field, at Alan Guiberson 1 Jack Lassiter, Section 308, Block 1-A, H&TC Survey. Operators drilled plug from casing set at 6,495 ft., and swabbed open hole to 6,528 ft., total depth. The well kicked off after 2 hours of swabbing and flowed at the rate of 300 bbl. of fluid a day. Operators estimated the flow to be 30 per cent oil and 70 per cent wash water. Top of the Marble Falls section was 6,466 ft., or 4,343 ft. subsea, and 77 ft. lower than Sun's discovery well, the 1 J. W. Arledge. Storage was being erected for further testing.

The Texas Co. 1 Victor Pierce, Crockett County wildcat 2½ miles southeast of Ozona, reported a third show of gas from 11,775-11,812 ft., where a drill-stem test flowed an estimated 500,000 cu. ft. daily, and threatened another blowout. According to some reports, the well could produce some 60,000,000 cu. ft. of gas a day.

Shamrock Oil & Gas Corp. 1 Herman G. Wendland, southeastern Coke County ellenburger discovery, flowed 254.5 bbl. of 47.1°-gravity oil in 24 hours early this week, to fill existing storage capacity. The test was made on 20/64-in. choke, from open hole pay at 6,235-50 ft., after a 1,000-gal. acid treatment. At the end of the flow period, tubing pressure remained at 275 psi., and casing pressure had gained from 280 to 910 psi. Operators said acid water had cleared up and there was no formation water. Later, when more storage was available, the well was placed on 32/64-in. choke for a few minutes, then changed to 20/64 in. Three 1-hour flow periods produced 15, 12 and 11 bbl. of oil. At the end of the 3 hours, tubing pressure was 200 psi., and casing 950 psi. Larger tanks were being readied for potential tests. Location for a ¼-mile outpost to the discovery was being made. Oil from the 1 Wendland is being trucked to Atlantic Refining Co.'s Bronte station, about 5 miles distant.

In Ector County, Humble Oil & Refining Co. 4 Yarbrough & Allen, Section 31, Block B-14, PSL Survey, and 3½ miles southwest of the Yarbrough & Allen field, ran a 1-hour drill-stem test on the McKee sand section from 10,235-10,273 ft. It produced a slight blow of air throughout the test and recovered 400 ft. of slightly gas-cut drilling mud. It was drilled to 10,288 ft., corrected depth, and was to make another test.

Republic Natural Gas Co. 1-E-A Rosa H. Barnett, scheduled Ellenburger test slightly more than 2 miles northwest of the Benedum discovery in Upton County, had prospects of oil production in the lower Permian at 7,460-7,545 ft. A 90-minute drill-stem test of that section brought gas to the surface in 15 minutes and recovered 250 ft. of 41.5°-gravity oil, plus 600 ft. of oil and gas-cut mud. There was no formation water. Flowing bottom-hole pressure was 400 psi., which increased to 2,200 psi. when shut in 15 minutes. On last report it was drilling ahead below 7,872 ft.

Other Upton County wildcats, in the Benedum area, included Oil Carriers, Inc., 1 Max Pray-State, 3 miles northwest of the pool, which was drilling below 10,889 ft. in shale and lime. Humble Oil & Refining Co. 1 Barnett, 3¼ miles north of the field, was below 10,071 ft. Richardson & Bass 1 Neal, 9 miles northeast of Benedum was below 6,773 ft. Plymouth Oil Co. staked a 1¼ mile northeast outpost to the Benedum field, which puts it across the line in Reagan County. It is the 1 Artisse Elliott, 660 ft. from south and east lines of Section 46, Block Y, MK&T Survey, scheduled to drill to 12,000 ft.

WEST TEXAS (DISTRICTS 8 & 7-C) SUCCESSFUL WILDCATS

Coke County: Seaboard & Southern Minerals 1 M. G. Reed, 1,980 ft. from S & W lines, Sec. 1, HE&WT Sur., 10 mi. SE Robert Lee, 6 mi. NW Tennyson, flowed 176 bbl. 47°-gravity oil a day, plus 250 bbl. salt water, 24/64-in. choke, GOR 1,950 cu. ft., tubing pressure 310-300 psi., casing pressure 800-750 psi., Ellenburger 6,182-6,200 ft., TD 6,219 ft., elev. 1,914 ft.

Gaines County: Anderson Prichard Oil Corp. 1 E. H. Jones, Sec. 21, Blk. A-7, PSL Sur., 5 mi. S Jones Ranch field, pumped 195 bbl. 35°-gravity oil in 21 hours, plus 27 bbl. water, Glorietta 6,030 ft., TD 7,850 ft., PB 6,134 ft.

Reeves County: C & B Oil Co. et al 1 Monroe, Sec. 13, Blk. 2, H&GN Sur., 2 mi. S Dixieland, pumped 82 bbl. 40°-gravity oil a day, plus 10 bbl. water, sand pay shot 3,853 ft. and 3,826-66 ft., TD 3,911 ft.

WEST TEXAS (DISTRICTS 8 & 7-C) WILDCAT FAILURES

Cochran County: Cities Service 1 F. O. Maston "C," Labor 19, League 150, Randall CSL Sur., 10 mi. SE Bledsoe, dry, TD 4,980 ft., no tops reported.

Pecos County: Herbert Long 1 Bonebrake, Sec. 114, Blk. 8, H&GN Sur., 12 mi. S Grand Falls, dry, TD 2,506 ft. in sand.

Reagan County: Superior Oil Co. 1-B-C University, Sec. 25, Blk. 8, University Lands, 6 mi. SE Texon, dry, TD 9,972 ft., Devonian 9,090 ft., Ellenburger 9,843 ft., elev. 2,932 ft.

Schleicher County: Sinclair Prairie Oil Co. 1 Mary F. McClatchey, Sec. 41, Blk. M., GH&SA Sur., 10 mi. NE Eldorado, dry, TD 7,429 ft., Strawn 5,880 ft., Ellenburger 6,410 ft., Hickory sand 7,362 ft., elev. 2,237 ft.

SOUTHEASTERN NEW MEXICO

HOBBS.—Barnsdall Oil Corp. 1-A State, 23-8s-32e, Chaves County, prepared to deepen after recovering 200 ft. of sulfur water, with no oil shows, on a drill-stem test between 4,330-4,432 ft. An earlier test from

(Continued on page 155)

ILLINOIS

Edwards County Gets O'Hara Pool Opener

MATTOON.—In the area near the Edwards-Wabash county line, Orville Weston 1 Hasewinkle, NW NW NW 22-1n-14w, is shut down for tank space to test the O'Hara at 2,924-29 ft. Early tests indicate that the well should make about 200 bbl. per day when completed. The well is south of West Lancaster pool and will open a new area.

Calvert & Willis 1 Mayne, SW SE NE 18-1s-14w, Edwards County, is cleaning out for a test of the O'Hara at 3,087-90 ft. and Rosiclare at 3,104-08 ft. A drill-stem test of the O'Hara recovered 90 ft. of oil-cut mud and a test of the Rosiclare recovered 120 ft. of oil and 60 ft. of oil-cut mud. Total depth is 3,223 ft. with casing set to 3,140 ft.

In Wayne County, National Oil Co. 1 Bothwell, SE SE NE 8-2s-8e, is cleaning out for further test of the McClosky. Latest reports indicate swabbing rate of about 100 bbl. per day. Total depth is 3,200 ft.

ILLINOIS WILDCAT FAILURES

Jasper County: Sun Oil Co. 1 E. Gillespie, SW NE NE 35-6n-8e, dry, TD 3,197 ft.

Clay County: Ashland Oil & Refining Co. and McCullough 1 Bankhart, NW NW SW 27-3n-6e, dry, TD 3,135 ft.

Lawrence County: K. Michel 1 Thompson, NE SE SE 29-2n-12w, dry, TD 1,702 ft.

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STATISTICS and T

WEEKLY WELL COMPLETIONS . . . WEEK ENDED JUNE 5, 1948

	Total of all wells					Cum.		Wildcat completions and discoveries					Cumulative total, 1948				
	Comp.	Oil	Gas	Dry	Footage	1948	1947	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	28	14	0	*14	32,900	680	547	0	0	0	0	0	0	0	0	0	0
Pennsylvania	46	18	7	†21	112,707	1,168	1,265	0	0	0	0	0	0	0	9	13	22
West Virginia	19	5	10	4	42,436	327	325	0	0	2	2	4	3	0	22	30	55
Ohio	30	11	8	‡11	70,063	556	541	0	0	0	0	0	2	0	8	14	24
Indiana	18	8	1	9	35,296	392	242	0	0	0	2	2	6	0	1	18	25
Kentucky	13	6	3	4	20,957	269	242	0	0	0	0	0	3	0	0	8	11
Illinois	39	22	0	17	101,263	857	792	0	0	0	3	3	17	0	1	131	149
Michigan	15	5	1	9	29,264	283	299	1	0	0	4	5	9	0	6	109	124
Kansas	75	33	11	31	242,586	1,216	1,041	2	0	2	15	19	23	0	4	165	192
Neb., Mo., Iowa	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0
Oklahoma	86	45	3	§38	305,377	1,669	1,677	3	0	1	11	15	55	6	13	269	343
Texas	228	146	16	66	936,628	4,733	3,621	11	1	5	37	53	138	13	46	831	1,028
North Central (Dist. 7-B & 9)	68	43	4	21	193,602	1,463	1,130	4	0	3	11	18	54	0	9	283	346
West (Dist. 7-C & 8)	70	61	2	7	305,877	1,272	862	3	0	0	3	6	22	0	2	88	112
Panhandle (Dist. 10)	10	7	3	0	29,760	250	180	0	0	0	0	0	0	0	1	6	7
Eastern (Dist. 5 & 6)	14	7	2	5	79,415	221	209	0	1	0	2	3	5	2	0	53	60
Gulf Coast (Dist. 2 & 3)	33	16	2	15	186,605	756	671	3	0	0	10	13	35	9	9	189	242
Southwest (Dist. 1 & 4)	33	12	3	18	141,369	771	569	1	0	1	11	13	22	2	25	212	261
Louisiana	48	35	3	10	253,257	883	519	1	1	0	4	6	15	9	2	84	110
Northern	29	22	2	5	89,870	588	286	0	0	0	2	2	0	0	0	42	42
Southern	19	13	1	5	163,387	295	253	1	1	0	2	4	15	9	2	42	68
Arkansas	1	1	0	0	3,225	127	116	0	0	0	0	0	3	0	0	34	37
Mississippi	8	5	0	3	56,570	167	173	0	0	0	3	3	2	0	3	38	43
Southeastern States	1	0	0	1	10,830	19	20	0	0	0	1	1	0	0	0	17	17
Montana	5	4	0	1	10,394	108	82	0	0	0	0	0	1	0	0	7	8
Wyoming	12	6	0	6	45,250	179	92	0	0	0	1	1	12	0	0	20	32
Colorado-Utah	5	3	1	1	34,712	106	72	0	0	1	0	1	0	0	1	17	18
New Mexico	7	6	0	1	37,633	263	218	0	0	0	1	1	4	1	0	18	23
California	56	47	0	9	216,042	1,222	844	2	0	0	7	9	31	0	0	123	154
Total United States	740	420	64	256	2,597,390	15,225	12,730	20	2	10	91	123	324	29	116	1,946	2,415
Total previous week	738	405	54	279	2,490,509	14,485	12,123	14	2	4	105	125	304	27	106	1,855	2,292
Total June 7, 1947	607	328	65	214	2,180,755			15	2	4	81	102	273	36	73	1,554	1,936

Service wells included: *14, †19, ‡3, §2.

CRUDE PRICES AND REFINERY ACTIVITY

GRAVITY SCHEDULES

Top prices include all gravities above grades designated, and low prices include all gravities below grades designated:

Gravity—	Signal Hill, Calif.	Oklahoma, Kansas	Gulf Coast Tex.*	West Tex.†
18-18.9	$2.17	....	....	....
19-19.9	2.19	....	....	....
20-20.9	2.21	$2.25	....	$2.12
21-21.9	2.23	2.27	....	2.14
22-22.9	2.27	2.29	....	2.16
23-23.9	2.30	2.31	....	2.18
24-24.9	2.34	2.33	$2.56	2.20
25-25.9	2.38	2.35	2.58	2.22
26-26.9	2.41	2.37	2.60	2.24
27-27.9	2.45	2.39	2.62	2.26
28-28.9	2.49	2.41	2.64	2.28
29-29.9	2.52	2.43	2.66	2.30
30-30.9	2.56	2.45	2.68	2.32
31-31.9	2.59	2.47	2.70	2.34
32-32.9	2.62	2.49	2.72	2.36
33-33.9	....	2.51	2.74	2.38
34-34.9	....	2.53	2.76	2.40
35-35.9	....	2.55	2.78	2.42
36-36.9	....	2.57	2.80	2.44
37-37.9	....	2.59	2.82	2.46
38-38.9	....	2.61	2.84	2.48
39-39.9	....	2.63	2.86	2.50
40 and above	....	2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point. †Includes Lea County, New Mexico.

A.P.I. REFINERY REPORT, WEEK ENDED MAY 29

(Thousands of barrels)

District—	Crude runs, daily avg.	Production: Gasoline†	Kerosine	Gas & dist. oil	Residual	Stocks at refineries, bulk terminals, in transit and in pipe lines: Gasoline*	Kerosine	Gas & dist. oil	Residual
East Coast	907	2,139	341	1,198	1,747	25,177	6,624	10,675	9,029
Appalachian:									
District 1	106	317	57	81	89	2,093	298	417	344
District 2	58	179	12	32	102	971	122	167	186
Ind., Ill., Ky.	909	3,235	377	881	1,142	21,482	2,621	4,641	4,105
Okla., Kans., Mo.	458	1,533	169	587	539	9,102	883	2,630	1,794
Inland Texas	251	986	91	178	418	3,448	617	429	891
Texas Gulf Coast	1,442	4,649	551	2,092	2,124	17,572	1,375	5,152	5,478
La. Gulf Coast	447	1,435	348	701	576	5,122	1,090	2,620	1,493
N. La. and Ark.	86	211	57	103	134	1,929	384	336	175
Rocky Mountain:									
New Mexico	13	43	7	12	27	109	25	30	32
Other Rocky Mt.	160	537	43	184	234	3,258	149	758	990
California	878	2,563	91	1,005	2,376	16,922	1,062	10,786	30,629
May 29, 1948	5,715	17,827	2,144	7,054	9,508	107,185	15,250	38,641	55,146
May 22, 1948	5,587	17,248	2,129	7,106	9,284	106,934	14,885	37,333	54,452
May 31, 1947	5,034	14,956	2,066	5,774	8,953	95,326	12,509	34,120	45,550

*Finished and unfinished. †At refineries including natural blended.

Bureau of Mines crude-oil stocks 221,703,000 bbl. as of May 29—down 19,000 bbl. One year ago 239,370,000 bbl.

FLAT CRUDE PRICES

Representative posted schedules per bbl.

East Texas	$2.65
Kettleman Hills, California*	2.14
Beauregard Parish	2.60
Illinois Basin	2.77
Pecos County, Texas (Yates)	2.35
Bradford, Pennsylvania	5.00
Eastern Ill. and Western Ind.†	2.77
Tomball, Texas Gulf Coast	2.83

*37°-37.9°. †35° and above.

TRENDS

DAILY AVERAGE PRODUCTION FOR WEEK

	June 5 crude oil	B. of M. June demand	May 29 crude oil
Alabama	1,450	1,500	1,350
Arkansas	82,430	87,000	82,150
California	946,800	946,000	947,500
Colorado	45,630	49,000	43,400
Eastern	67,500	64,900	67,200
Florida	700	1,000	700
Illinois	173,500	178,000	173,700
Indiana	21,500	16,000	20,500
Kansas	305,300	300,000	303,900
Kentucky	26,300	26,000	25,500
Louisiana	467,025	488,000	465,825
North Louisiana	111,400	.....	111,150
South Louisiana	355,625	.....	354,675
Michigan	44,500	46,000	46,200
Mississippi	123,100	124,000	122,015
Montana	22,720	26,000	23,630
Nebraska	450	600	450
New Mexico	127,650	136,000	126,000
Oklahoma	426,000	425,000	423,050
Texas	2,446,500	2,490,000	2,419,325
Dist. 1 (Southwest)	28,175	.....	26,850
Dist. 2 (Southwest)	173,175	.....	171,950
Dist. 4 (Southwest)	256,425	.....	255,650
Dist. 3 (Gulf Coast)	496,600	.....	492,850
Dist. 5 (Eastern)	46,750	.....	46,325
Dist. 6 (Eastern)	122,750	.....	121,900
East Texas field	309,425	.....	303,000
Dist. 7-C (West)	45,925	.....	44,975
Dist. 8 (West)	694,775	.....	687,875
Dist. 7-B (W. Central)	47,450	.....	45,000
Dist. 9 (N. Central)	139,400	.....	138,450
Dist. 10 (Panhandle)	85,650	.....	84,500
Wyoming	144,590	155,000	147,830
Total United States	*5,473,645	5,560,000	5,440,225

Change from prev. wk., up 33,420

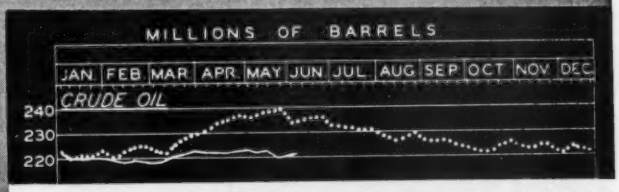
Total production January 1-June 5 ..... †854,385,775 bbl.

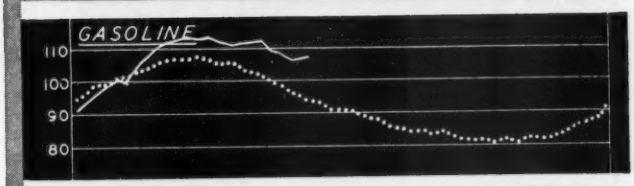
Same period last year (crude plus cond.) .. 761,450,590 bbl.

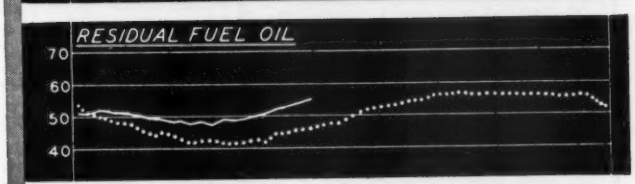
*Not incl. 77,420 bbl. condensate. †Incl. 11,627,220 bbl. condensate.

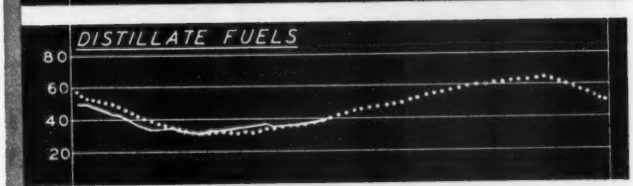
STOCKS IN UNITED STATES

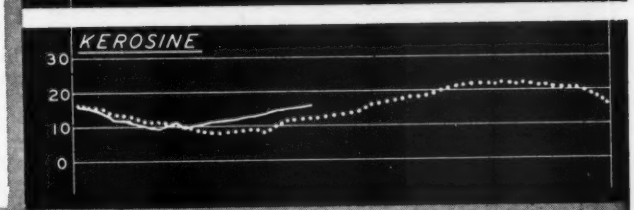
---- 1947 ——— 1948





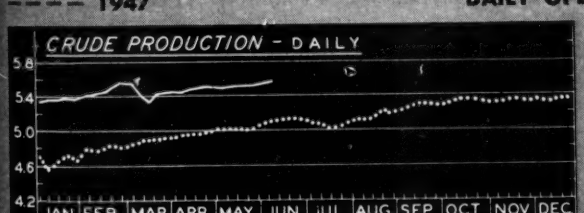


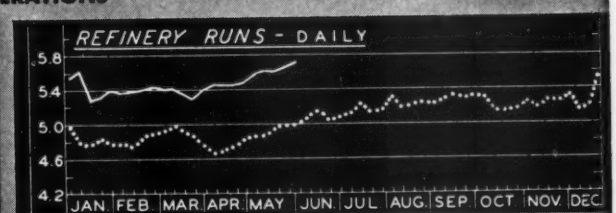




DAILY OPERATIONS

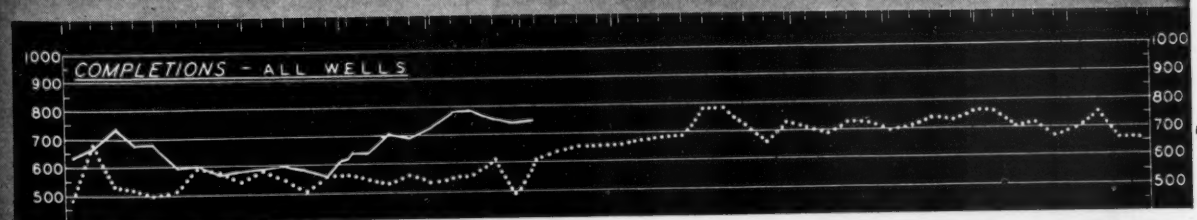
---- 1947 ——— 1948





WEEKLY COMPLETIONS

---- 1947 ——— 1948



ANNOUNCEMENT

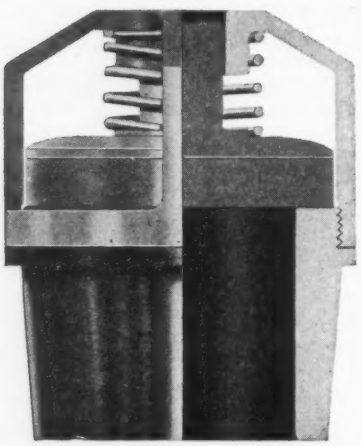
The Engineering Development Company and the Spartan Drilling Company announce that their second turbine drilling operation will be started in South Arkansas between June 15 and June 20, 1948.

Interested members of the industry are invited to attend. Details on location and exact commencement date can be secured from:

The Engineering Development Co.
Telephone: R 5888
601 Dallas National Bank Bldg.
DALLAS 1, TEXAS

722 Ardis Bldg.
Telephone: 2-3293
SHREVEPORT, LA.

Grady H. Vaughn
Telephone: 84
MAGNOLIA, ARK.



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PUMP VALVE

For all pipe-line and refinery service. Extremely light and especially good for light fluids and long suction lines. Bronze or malleable cage; steel stem and body; reversible bakelite disc; hardened and ground steel seat. Many thousands of these valves now in service in main line pipelines have proved their efficient performance.

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PUMP VALVE CO.
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MARKETS

INDEPENDENT traders in petroleum products on the Gulf Coast reported last week that material of all types was exceedingly scarce. Little movement on the spot market was apparent, and prices where available were showing an upward trend.

One buyer said he had scouted the market without success. Preparations of foreign buyers to enter the market for light distillate after July 1 when the new quarter begins appeared to be giving further strength to this market. It was said less No. 2 fuel than might be expected at this season is going to storage and that much of it is being used as cracking stock.

Cargo No. 6 Tightening

A tightening supply in No. 6 fuel oil for water shipment also was reported. Lowest price mentioned was $3.35, and one source told of a movement of cargo No. 6 at $3.40. Marketing officials speculated whether steel companies were stocking in anticipation of a coal strike.

Spot sales of gasoline in the Mid-Continent area continued to grow even tighter last week. Demand for this product has continued to mount and inquiries are reported coming more frequently. In the Oklahoma area spot sales of gasoline were practically at a standstill.

One leading Mid-Continent supplier last week dropped his spot-market price quotation on 130-132 crude scale wax from 7 to 6¾ cents per pound.

Although stocks of gasoline in the Middle West decreased in the week ended May 29, there was a gain of 9.9 per cent over the stocks at this time a year ago. Of course, demand has also increased substantially, but nevertheless most observers are of the opinion that this summer's peak demand season will be met "at least as well as the situation was handled last year."

No. 2 continued to draw a strong demand paricularly from suppliers wanting this product for storage. Some burning oil is even now being used where the temperature still dips low enough to necessitate the use of home burners. One Mid-Continent refiner reported a request for 5,000,000 gal. of No. 2 for delivery to New York. Most refiners are said to be storing as much as possible of this material. Spot-sales prices are ranging from 9 to 9¾ cents per gallon with the bulk of the shipments moving at 9¼ cents.

Burning oil stocks in the Middle West advanced considerably for the week ended May 29, showing an increase of 64.8 per cent over the stocks of a year earlier.

Kerosine Demand Is Firm

Twenty-five cars of kerosine were reported moved at 10½ cents per gallon. This was not confirmed. Most kerosine was available at 9¾ cents although not plentiful, according to one buyer. Farm demand for kerosine remained firm with much of it going for incubators, tractors, and also a considerable portion for storage for winter supply.

In New York Harbor area buyers were reported willing to pay 10.75 cents for No. 2 fuel for storage. Along the Atlantic Coast No. 2 and kerosine generally were in tight supply.

Most Atlantic Coast suppliers were more willing to pay relatively stronger premiums for heating oils and residuals than for motor fuel. A favorable outlook for the gasoline supply was seen by a gain for the second consecutive week in motor fuel stocks along the East Coast. Prices generally remained unchanged.

Representative Quotations

Representative spot-market quotations of leading suppliers as of June 7, 1948. Figures are f.o.b. plant for tank-car shipment in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor	Texas Gulf Coast
Regular gasoline, 73-75 octane	10½-12	11.6-12* 10.5-11.9†	10.9-12¾
Premium gasoline, 78-80 octane	11½-13	10.6-13.4	12.9-13½
42-44 w.w. kerosine	9½-10	10.3-11.9	10¼
No. 2 straw fuel oil	9-9½	9.4-10.9	9.05- 9¾
No. 6 residual	$2.50-2.65	$3.03-3.90	$2.56-3.00

*Branded (74-76 octane); †Unbranded (74-76 octane).

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	8½	8	8¼
Grade 18-55	10.2	9.6	9.9

LUBRICATING OILS

South Texas

200 vis., No. 2-3 neutral	13-14.5
750 vis., No. 3-4 neutral	15-17.25
2,000 No. 5-6 neutral	17-18½

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	30-32
200 vis. No. 3 neutral, 0-10 pp.	30-31

Western Pennsylvania

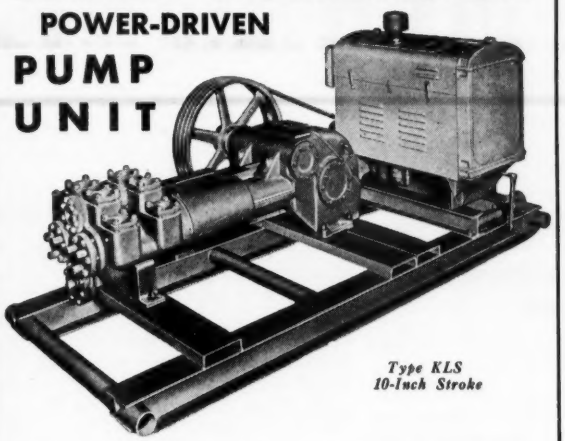
145-155 vis. 10 p.t. bright stock	47
180 vis. p.t. neutral	48

CRUDE-SCALE WAX

Mid-Continent

130-132 A.S.T.M. melting point	6¾-7½

LOCKETT-WORTHINGTON POWER-DRIVEN PUMP UNIT



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10-Inch Stroke

WORTHINGTON Pumps and genuine Worthington Repair Parts are available — through Lockett Dealers — from Warehouses maintained in the principal oil fields throughout Texas and Louisiana, backed up by a large replenishing stock at our Houston and New Orleans Warehouses. This enables Lockett Dealers to promptly supply needed equipment. Worthington Pumps are adaptable for use with Engines or Motors of any specified type or manufacture, to provide a complete pumping unit.

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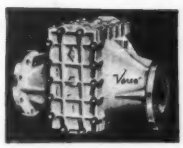

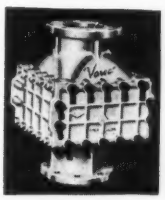

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IN handling inflammable gases, the danger of fire and explosion is ever present. Resulting flames will travel rapidly along lines of least resistance. When your gas lines are protected with "VAREC" Approved Flame Arresters, you can be sure of stopping flame propagation to any storage or gas-making unit.

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"VAREC" Approved Flame Arresters are listed by the Underwriters' Laboratories and approved by Factory Mutual Laboratories as well as other safety authorities. Demand that these accepted devices be installed on all your inflammable gas lines.

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EQUIPMENT MEN ... in the News

Schlichting Named Sales Manager

The appointment of Walter G. Schlichting as sales manager of the heating, cooling and air conditioning division of Young Radiator Co. has been announced.

Schlichting is a graduate of University of Illinois with a bachelor of science degree. He has had a long association in the sales and engineering field in heating, cooling, and air conditioning and prior to joining the Young Radiator organization was manager of the air conditioning division of Clarage Fan Co., Kalamazoo, Mich.

Continental Supply Personnel Changes

W. E. Lasseter, former Continental Supply Co. sales representative at Duncan, Okla., has been appointed store manager, succeeding W. O. Begley, Jr., who will remain at Duncan in the capacity of field salesman.

Other recent personnel changes announced by Continental are the appointment of Glen R. Pike as store manager of the Hobbs, N. M., store, succeeding Noble D. Lane, who has been transferred to the Fort Worth district office as district salesman. Pike was formerly field salesman at Hobbs.

R. L. Faris, former salesman at Corpus Christi, has been transferred to Continental's export division in New York City. He will serve in the same capacity at that point.

Cypher Heads New Organization

Robert W. Cypher, formerly with the sales organization of Patterson Ballagh division of Byron Jackson Co., now heads his own company, Cypher System, Inc. The new organization is engaged in the manufacturing and marketing of a system for the control of electrolysis in oil wells and has its main offices and service facilities in Long Beach, Calif.

The Cypher system consists of a mixing unit placed at the bottom of the well controlled by electrical measurements to insure continued high resistivity of the well fluid.

Geist Again President Of Allis-Chalmers

Walter Geist was elected to his seventh term as president of Allis-Chalmers Manufacturing Co. recently and all directors and officers were re-elected at the annual meeting of the firm's stockholders and board of directors.

Directors renamed by the stockholders are James M. Barker and James D. Cunningham, Chicago; Arthur W. Butler, New York; Hugh Comer, Sylacauga, Ala.; Ernst Mahler, Neenah, Wis.; Leigh Willard, Cleveland; and W. C. Buchanan, Geist, W. C. Johnson, Walter Kasten, Louis Quarles, and W. A. Roberts, all of Milwaukee.

In addition to Geist, the officers named by the board of directors are Roberts, executive vice president in charge of the tractor division; Johnson, executive vice president in charge of the general machinery division; J. A. Keogh, vice president and comptroller; H. W. Story, vice president and general attorney; W. E. Hawkinson, secretary and treasurer; E. H. Brown, vice president in charge of engineering development; Marshal L. Noel, vice president and general sales manager for the tractor division; and J. L. Singleton, vice president and director of sales for the general machinery division.

Other officers chosen by the board are J. F. Ryan, assistant secretary and assistant treasurer; C. P. Allendorf, assistant comptroller; N. D. Johnson, assistant secretary; and G. F. Langenohl, assistant treasurer.

McCracken and Leo Named Texas Managers

George P. McCracken has been appointed district manager, San Antonio office, Sheffield Steel Corp., succeeding George P. Lacy, who has been promoted to manager railroad sales, with headquarters at Kansas City.

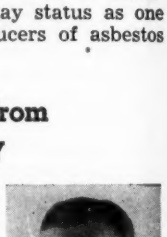
Walter H. Leo has been appointed district manager, Dallas office. Leo has been associated with Sheffield nearly 7 years in various capacities and has recently served in the St. Louis office.

Tom J. Rawlings will continue to serve as district sales representative, Dallas office.

Keasbey & Mattison Celebrates 75th Anniversary

The 75-year history of Keasbey & Mattison Co., Ambler, Pa., is presented in a new booklet entitled "Anniversary in Ambler." This sketch of the company, America's original makers of asbestos and magnesia products, covers the history of the company from its beginning by its founders, H. G. Keasbey and R. V. Mattison, to its present-day status as one of the leading producers of asbestos products.

Barton Retires From National Supply



Charles R. Barton, vice president in charge of manufacturing for National Supply Co., is retiring after 30 years of service.

Barton has been a prominent figure in manufacturing circles for nearly 40 years. After attending Purdue University and Carnegie Institute of Technology, he became associated in 1909 with National Tube Co. in Ellwood City, Pa. He rose from foreman on the piercing and rolling mill to assistant general superintendent in 1914.

He became general superintendent of Standard Seamless Tube Co. at Ambridge, Pa., in 1918 and, 10 years later, when that company was acquired by Spang-Chalfant & Co., he was elected vice president in charge of operations and a director of the latter company.

Since 1937, when Spang-Chalfant was consolidated with National Supply Co., he has been a vice president and director. In 1940 he was placed in charge of all manufacturing operations of National Supply's six plants in this country.

Moore Products Opens Houston Office

Moore Products Co., Philadelphia, announces the opening of a Houston branch office with Robert A. Barnes as manager. This office, located at 7041 Harrisburg Boulevard, will be a sales and service center for Nullmatic industrial instruments.

New Appointments in Oil Well Supply

J. W. Brown has been named manager of Oil Well Supply Co.'s store at Bakersfield, Calif. A native of Hamlin, Tex., where he attended high school, Brown served with the Army Air Forces in World War II. He has been a storeman in the Bakersfield store since joining Oilwell in August 1947.

Appointment of V. C. Richards as manager of the Artesia, Colo., store has been announced. He succeeds A. P. Wells who has become a field representative in the Artesia area.

C. M. Wittum, eastern division credit manager for Oil Well Supply since August 1946, has been appointed credit manager for that U. S. Steel subsidiary's Mid-Continent and Rocky Mountain divisions.

W. D. Bauman, who has been with Oilwell's eastern division credit office at Columbus, Ohio, since 1938, was named to succeed Wittum. Bauman joined Oilwell in 1929 in the credit department at Pittsburgh.

M. M. & M. Adds Airex Hydraulics Division

Announcement is made by Manning, Maxwell & Moore, Inc., New York, of the acquisition of the hydraulics division of Airex Manufacturing Co. in Long Island City.

Manning, Maxwell & Moore will develop industrial applications for Airex hydraulics products in addition to the present hydraulic line of relief valves, other hydraulic valves, filters, and pneumatic pressurizing valves.

Airex hydraulic operations will be carried on by Manning, Maxwell & Moore, Inc., at their Jersey City plant, 450 Communipaw Avenue.

Norman Collins, hydraulic engineer, with the Airex Manufacturing Co., has joined the company together with other key Airex personnel.

Republic Supply Opens Lake Charles Store

More than 500 oil men and oil equipment people, representing all phases of the industry from nearby oil fields and plants, attended the opening ceremonies of Republic Supply Co.'s new store in Lake Charles, La., recently.

Visitors were treated to a preview of the latest innovation in oil-country supply-store design and arrangement. The new store is an attractive one-story structure of modern design with separate sales offices and display quarters to provide additional customer convenience.

Acting as hosts for the celebration were the store's personnel, including M. H. Suggs, store manager; R. R. Goforth, office manager; C. R. Smith, refinery and industrial representative; J. C. Spillar, oil-field representative; and M. E. Cassidy, floorman. In addition, the following officials from Republic's general offices in Houston were present: Don Collins, executive vice president; Harry B. Catlow, vice president and manager of sales; H. C. Kinney, district manager; W. M. Haynes, manager of refinery sales; J. L. Anning, refinery sales; R. E. McCullough, purchasing agent; O. F. Adams, assistant to the sales manager; C. L. Gillespie, pipe department; and other sales representatives.

Well Explosives Changes Name

The name of Well Explosives, Inc., has been changed to Welex Jet Services, Inc. The change in name is effective by virtue of a charter amendment issued by the State of Texas.

This change in name does not involve any change in personnel, policies, or ownership.

Hall Returns From Middle East Tour

George W. Hall of Weatherford Spring Co., Weatherford, Tex., has recently returned from a 4-month trip to the oil fields of Iran, Iraq, Kuwait, and Saudi Arabia, inspecting Weatherford Spring oil well cementing installations at these points. Leaving Weatherford on January 6, he flew to London, thence to Kuwait on the Persian Gulf. From Kuwait, he made inspection tours of oil fields at Masjid-i-Sulaiman, White Oil Springs, Haft Kel, Lali, Ahwaz, Agha Jari, and the refinery at Abadan, all in Iran. Later he inspected the fields at Dhahran, Saudi Arabia, and Bahrein Island in the Persian Gulf.

Tagliabue Announces Office Removal

C. J. Tagliabue Corp. (N. J.), formerly C. J. Tagliabue Manufacturing Co., Brooklyn, N. Y., has announced the removal of its offices and production facilities to 614 Frelinghuysen Avenue, Newark 5.

Now a wholly owned subsidiary of Weston Electrical Instrument Corp., the firm will continue to manufacture its well-known line of TAG instruments for indicating, recording, and controlling temperature and pressure, including TAG A.S.T.M. thermometers, A.P.I. hydrometers, and petroleum-testing apparatus.

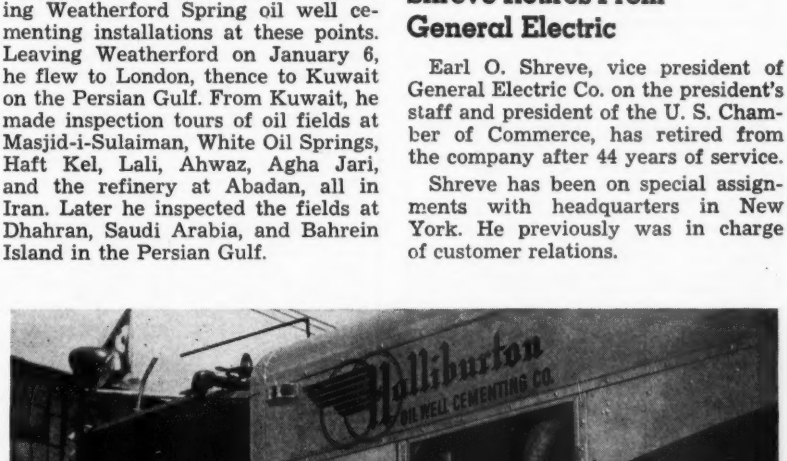
Lipscomb to Represent F.T.R.C.

Federal Telephone & Radio Corp., Clinton, N. J., associate of International Telephone & Telegraph Corp., announces that Earl Lipscomb Associates of Houston and Dallas will represent Federal's wire-transmission and transformer divisions in the southwest United States. This trade area will include the states of Texas, Louisiana, Oklahoma, Arkansas, and New Mexico.

Shreve Retires From General Electric

Earl O. Shreve, vice president of General Electric Co. on the president's staff and president of the U. S. Chamber of Commerce, has retired from the company after 44 years of service.

Shreve has been on special assignments with headquarters in New York. He previously was in charge of customer relations.



G-M executives inspect their diesel units—H. J. Cupper, second from left, assistant to the vice president in charge of the General Engine Group, General Motors Corp., Detroit, stands before one of Halliburton Oil Well Cementing Co.'s super cementers, with V. C. Genn, general sales manager for the Detroit Diesel Engine Division of G-M (second from right) and F. G. Shoemaker, consulting engineer of the Diesel Division of G-M. At extreme left is W. D. Owsley, technical adviser for Halliburton. Although they had seen various component parts of the cementing unit, the International Petroleum Exposition afforded the three their first glimpse of the complete equipment

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All ads, 10 cents a word. Minimum charge, $2.00 per insertion.
Centered Line, any ad, 75 cents.
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P. O. Box 1260, TULSA, OKLAHOMA

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Box 107, Red Fork Station, Tulsa, Oklahoma

FOR SALE—R. L. Cardwell sub frame with beam, temper screw, rod hanger & header. Complete less draw works. Drilled in 6 wells. One-half price. One telescoping mast 8" & 7" 3 sheve crown. Wood Drilling Co. Pho. 154, Hoisington, Kansas.

HALF TRACK SALE

Slightly used Half Track Trucks powered by 160 H.P. White Engines (Manufactured by White Motor Truck Company). Excellent for high speed towing, transportation under adverse weather conditions, mounting cranes or other special equipment; makes excellent shop or service truck. A combination Tractor —Truck — Wrecker that can drive on front and rear axles, or rear axle can be disengaged. Front tires are 8.25 x 20; ten speeds forward; two speeds reverse. Weighs approximately 14,000 lbs. Some models are complete with Tulsa Winch. Original cost to Government about $8,000.00. Sale Price $895.00 to $1250.00. Located at Pueblo, Colorado; Salt Lake City, Utah, and Dallas, Texas. Send inquiries to

BERNSTEIN BROTHERS
(Since 1890)
PUEBLO, COLORADO

EQUIPMENT FOR SALE

1 #45 Fort Worth Spudder, complete with tools to drill 4500 foot well. Condition of rig and tools A-1. For complete inventory of this equipment, write Joseph J. Snyder, 503 Oak Street, Carmi, Illinois.

FOR SALE: Failing '36 Drilling Rig, mounted on 1940 Ford. In good condition and ready to drill. Clemens Exploration Co., Box 136, Princeton, Indiana.

KEYSTONE 5½ cable tool rig: This drill will do a lot of work with a minimum of maintenance. Trailer mount and with or without tools. C-344, The Oil and Gas Journal, Tulsa, Oklahoma.

STEEL STORAGE TANKS

2—74,000 Bbl. Cap. Riveter
8—10,000 Gal. Cap. Horiz. Welded
100,000 Gal. Cap. on 110 Ft. Tower.

DARIEN CORP.
60 E. 42nd St., N. Y. 17, N. Y.

PARTS FOR ARMY TRUCKS

New and Used

Largest stock in America, 6x8, 6x4, 4x4, 4x2. All items guaranteed. Largest auto wrecking house in the west with most complete stock of new and reconditioned parts for all cars and trucks. New jeep power units complete with radiators and stub shafts. Fast service.

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Steel Pipe and Tubing
Pipe Fittings—Well Casing
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DISMANTLED READY FOR IMMEDIATE SHIPMENT

Towers and Vessels	Valves and Fittings
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Located at Enid and Tulsa, Oklahoma. Used less than 15 months.
Guaranteed first class condition. Inspection invited.

PETROLEUM EQUIPMENT, INC.
P.O. Box 887 — Thrasher Building
Tulsa, Oklahoma — Telephone 2-6291

EQUIPMENT FOR SALE

KEYSTONE Model 50 Spudders: 3 late model rigs for sale early in May; 1 truck mounted, 1 semi-trailer mounted, and 1 skid mounted or sold as is on low mileage GMC 6x6 truck. Tool layout optional with buyers. C-343, The Oil and Gas Journal, Tulsa, Oklahoma.

10,000 and 5,000 Barrel
NEW A.P.I. BOLTED STEEL TANKS
In stock delivery and erection
Mid-Continent Field

McGUFFIN TANK CO.
Shreveport, Louisiana
(Distributor Columbian Steel Tanks)

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12—230 H.P. Type 10 Bessemer New 17" Power Cylinders complete ready to run with 16" to 18" Compressors. 1—230 H.P. Clark Horizontal with Compressors. Located Salem, Illinois.

ENGLE PETROLEUM, Incorporated
Box 655, Evansville, Indiana

PUMPS

Centrifugal and Reciprocating Chrysler Industrial Engines. Write for list and prices.

H. A. McCARTHY
310 Thompson Bldg., Tulsa, Oklahoma
Phone 5-3296

WILL SACRIFICE!

Must Vacate Property

RECIPROCATING STEAM PUMPS

4—Simplex 24 x 6 x 16 Hot Oil
1—Duplex 10 x 3½ x 10 Hot Oil
1—Simplex 8 x 4 x 12
3—Duplex 7½ x 6 x 10 Water cooled
2—Duplex 7 x 4½ x 10
7—Duplex 6 x 4 x 6
4—Duplex 4½ x 2¾ x 4

STEEL STORAGE TANKS

1—10,000 gal. Horizontal 12' x 12'
3—10,000 gal. Horizontal 7' 6" x 32' 10"

BUBBLE AND OTHER TOWERS

1—3' x 50' x3/8", 17 trays, 24 C/1 Bubble Caps, welded seams
1—2' x 44' x 3/8", 31 trays, dished heads, welded seams
1—3' x 40' 6" x ¼", 15 trays, dished heads, welded seams
1—3' x 38' x ¼", 15 trays, dished heads, welded seams
1—6' x 50' 6" x ½", 18 trays, 64 C/1 Bubble Caps, welded seams
1—7' x 60' x ½", 24 trays, 86 C/1 Bubble Caps, welded seams
1—Clay Tower 10' x 35' 6" x ½", dished heads, welded seams
2—Tar Stripper 6' x 28' 6" x 3/8", 1 tray, dished heads, welded seams
1—Stripper 2' 6" x 16' x 5/16", dished heads, welded seams
2—Side Stripper 3' x 12' 4" x 5/16", 4 trays, dished heads, welded seams
1—Vessel, 4' 11" x 13' 10" x 1", dished heads
2—Vaporizer 6' x 30' x ½", welded seams, dished heads
1—Vaporizer 6' x 30' x 3/8", welded seams, dished heads
1—Vaporizer 5' x 24' x 3/8", welded seams, dished heads

BRICK UNIT FURNACES

1—19' 2" x 24' 8" x 17' 6" x 24" Wall Thickness. 156 Plain carbon steel tubes, 4" OD x 22' x 7/16", 10 Zinc Natural Gas Burners. Complete with stack.
1—17' x 22' 5" x 24" Wall Thickness. 120 Plain carbon steel tubes 3" OD x 20' x ½", 6 Zinc Natural Gas Burners, Complete with stack.

PLUS HEAT EXCHANGERS, CONDENSER BOXES, COIL FURNACES, INSTRUMENTS.

Rush inquiries and request for complete listings to

BROWN-STRAUSS CORPORATION
P. O. Box 11
Galena Park, Texas
All listings subject to prior sale.

LEASE AND DRILLING BLOCKS

HAVE oil leases on structure 650 feet. Can give offsets. Will take override. Box 86, Casey, Illinois.

FOR SALE: New Mexico Oil and Gas Lease in Eddy County. Will sell for cash and royalty. E. T. Moorefield, Jr., Box 506, 657 W. Main St., Danville, Virginia.

FOR SALE: 1600 acres oil and gas leases on structure, with 3 well drilling, casing and shooting proposition. Depth of drilling 650 to 700 ft. W. P. Harley, Bowling Green, Ky.

SOUTHEASTERN NEW MEXICO
Leases, royalties and drilling blocks. Grant Keyes, 311 White Bldg., Roswell, New Mexico.

FOR LEASE by owner, 104 acres proven for both oil and gas at 1900 ft. $5.00 per acre. W. H. Mahon, P.O. Box 821, Brownwood, Texas.

LEASE 28,700 acres in Cuba. Complete magnetometer and geological survey. Several good anomalies. Estimated depth to production less than 2,000 ft. Eighteen active oil seepages in this area. Sites accessible rail and road. Surface royalty 1% by law. You pay us 7% royalty, $15,000 lease money, lease rental 20 cents per acre yearly. Twenty year lease. Our Titles perfect. Government oil tax your account. No options. Definite tax advantages operating in Cuba. If desired will put right parties in touch with reliable drilling contractor for turnkey job. This is best shallow field oil proposition in Cuba. Box C-406, The Oil and Gas Journal, Tulsa, Oklahoma.

IT has been said that the man who doesn't advertise his business hasn't any. My business is leasing. If yours is producing and you can start drilling within a reasonable time, why not pull together? My take 12½%, lessee's 2½% override, balance yours. Lease assignment good for five years from last Sept. Moffat County, Colorado, just north of Wilson Creek Field. Whether you feel SE Quarter 16, 3N 94 West is worth one or four spuds, write Wm. Leonard Fisher, Attu, Alaska.

SOUTH AMERICAN PROVEN OIL LAND

25,000 acres in proven producing areas for sale or lease in South American Republic. Pipe line outlet. Property free from any encumbrances. Principals need only apply. Box C-402, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE

ALUMINUM PAINT—200—5 gallon cans, Exterior Spar Varnish vehicle. Highly polished, Aluminum Paste pigment in separate container. Distributors Liquidation. Regular price $24.75—take any part, $10 per 5 gallon can. Send check with order. The National, 606 Walnut, Kansas City, Missouri.

ROYALTIES

ANDREW J. BARRETT
The Philtower
Tulsa, Oklahoma

DEEDED ROYALTIES
San Juan Basin & Permian Basin. Write Harry S. Wright, Wright Bldg., Farmington, New Mexico.

SEE A. L. BOWLES, Ada, Oklahoma, for drilling deals, leases, royalties.

WE will buy producing or non-producing oil royalties. Send particulars. Standard Security Company, 115 Broadway, New York 6.

PROFIT BY BUYING
ROYALTIES WHERE
THE PLAY IS HOT
AND PRICES LOW!
The Rocky Mountain area is seething and one of the hottest spots is east of the Rockies in Montana, southeast of Gulf's major strike near Glacier Park. The big companies are pouring in and the time to buy royalties is NOW—ahead of production. This is when the real profits are made. This firm is in its 25th year and specializes in AHEAD-OF-THE-DRILL royalties, in major company blocks. WRITE US TODAY! Landowners Royalties Company, Montana Power Bldg., Great Falls, Montana.

PATENT ATTORNEYS

PATENT Practice before U. S. Patent Office. Validity and Infringement Investigations and Opinions. Booklet and form "Evidence of Conception" forwarded upon request. Lancaster, Allwine & Rommell, Registered Patent Attorneys, Suite 418, 815-15th Street, N.W., Washington 5, D. C.

LEGAL

Notice is hereby given that oil and gas leases on the following described Crow Tribal lands will be offered at public auction at the Crow and Northern Cheyenne Agency, Crow Agency, Montana, at 2 o'clock P. M., M. S. T., June 15, 1948.

Unit No. 1. Description: In Township 9 South, Range 37 East. Sec. 15: S½; Sec. 16: S½; Sec. 17: SE¼; Sec. 20: E½; Sec. 21: All; Sec. 22: All. Acreage 2400.00.

Unit No. 2. Description: In Township 9 South, Range 37 East. Sec. 28: All; Sec. 29: E½, SW¼; Sec. 32: N½, N½S½, Lots 1, 2, 3, 4; Sec. 33: N½, N½S½, Lots 1, 2, 3, 4. Acreage: 2331.73.

Unit No. 3. Description: In Township 9 South, Range 37 East. Sec. 31: NE¼, N½ SE¼, Lots 1, 2, 3, 4, 5, 6. Acreage: 474.58.

Unit No. 4. Description: In Township 9 South, Range 37 East. Sec. 13: SW¼; Sec. 14: S½; Sec. 23: All; Sec. 24: All. In Township 9 South, Range 38 East. Sec. 19: E½ SW¼, Lots 3, 4; Sec. 29: NW¼; Sec. 30: NE¼, E½NW¼, Lots 1, 2. Acreage: 2392.30.

Unit No. 5. Description: In Township 9 South, Range 37 East. Sec. 26: All; Sec. 27: All; Sec. 34: N½, N½S½, Lots 1, 2, 3, 4; Sec. 35: N½, N½S½, Lots 1, 2, 3, 4. Acreage: 2516.08.

Unit No. 6. Description: In Township 9 South, Range 37 East. Sec. 25: All; Sec. 36: N½, N½S½, Lots 1, 2, 3, 4. In Township 9 South, Range 38 East. Sec. 30: E½SW¼, SE¼, Lots 3, 4; Sec. 31: E½, E½W½, Lots 1, 2, 3, 4. In Township 10 South, Range 38 East. Sec. 6: NE¼, E½NW¼, Lots 1, 2, 3, 4, 5, 6. Acreage: 2669.22.

Unit No. 7. Description: In Township 9 South, Range 38 East. Sec. 29: S½; Sec. 32: All; Sec. 33: All. In Township 10 South, Range 38 East. Sec. 4: N½, Lots 1, 2, 3, 4; Sec. 5: N½, Lots 1, 2, 3, 4. Acreage: 2560.59.

This sale will be conducted under the regulations prescribed by the Secretary of the Interior (Part 195, Title 25, Code of Federal Regulations). The leases will be sold to the highest responsible qualified bidder for a cash bonus upon an acreage basis in addition to the royalty of 12½ per cent and rental of $1.25 per acre per annum. The successful bidder must deposit with the superintendent on the day of the sale a certified check or bank draft on a solvent bank in an amount equal to 20 per cent of the bid and of the first year's rental as a guaranty of good faith. The balance of the bonus bid and of the first year's rental shall be paid and the lease in completed form shall be filed with the superintendent within 20 days from the date it is received by the successful bidder for execution. Failure in those conditions may subject the bid to cancellation and the forfeiture of payments already made.

No individual corporation, partnership, company or association shall hold oil and gas leases covering Indian Tribal lands and restricted allotted Indian lands on any one Indian reservation in excess of 25,000 acres except in the state of Oklahoma, in which state there is no acreage limitation.

Leases shall be made for a period of ten years from date of approval by the Secretary of the Interior with the right of renewal for an additional period of ten years upon such terms and conditions as the Secretary of the Interior may prescribe and by showing to the satisfaction of the Secretary of the Interior that the leased premises are producing oil or gas in paying quantities.

The right is reserved by the Secretary of the Interior to reject any and all bids and to disapprove and reject prior to approval any lease made on an accepted bid; and should any bid be rejected or lease be disapproved through no fault of the bidder, after deposit has been made, such deposit shall be immediately returned. Each successful bidder shall pay a prorata share of the cost of advertising.

For further information call or write L. C. Lipport, Superintendent. Date: May 14, 1948.

FOR SALE OR LEASE

50′ wide x 105′ long, steel frame, corrugated iron covered building, with 20′ wide wood frame corrugated iron covered side addition, with 2 approx. 19 x 19′ offices. All set on concrete foundation and floor. Building contains 1—5 and 1—7½ ton 50 ft. span travelling overhead crane; also 1—5 ton Gib crane in rear. Track spur. On approx. 1 acre lease—runs to Feb. 1952. Located in town of Greggton, (near Longview), Texas.

On improved street and Texas State Highway No. 80.

Suitable for many business purposes.

Responsible inquiries for purchase or lease are invited.

THE NATIONAL SUPPLY COMPANY

Fort Worth, Texas

Sinclair Building **Phone 3-1291—LD-195**

Permian Basin

(Continued from page 145)

4,250-4,330 ft. recovered 150 ft. of oil and gas-cut mud.

Southeast of Elkins in Chaves County, Atha Exploration Co. 2 Lightcap, 24-7s-28e, found stains and good oil odor in samples to 2,524 ft., and prepared to set 7-in. casing to test. Scheduled depth was 3,000 ft., with cable tools.

In Lea County, Skelly Oil Co. 7 Sims, 3-23s-37e, was drilling below 7,270 ft. A 3-hour drill-stem test between 6,937-7,080 ft. brought gas to the surface in 20 minutes and recovered 210 ft. of slightly gas-cut mud.

Texas Pacific 39-A State, 9-22s-36e, was drilling below 9,250 ft. Gulf Oil Corp. 1 Saltmount, SE SE 21-23s-37e, ran a 90-minute drill-stem test at 7,314-57 ft. Gas showed in 3 minutes, and the recovery was 540 ft. of oil, and 270 ft. of oil-cut mud. It was drilling ahead below 7,510 ft. Gulf 1 Fanning, 33-23s-37e, was drilling below 9,450 ft. Gulf 5 Graham-State "F," 36-19s-36e, recovered 120 ft. of mud on a 1-hour drill-stem test from 8,249-8,300 ft., and continued drilling below 8,429 ft. in lime.

SOUTHEAST NEW MEXICO WILDCAT FAILURE

Lea County: Deep test in Eunice-Monument area, Amerada Petroleum Corp. 2 Record, SE NE 25-19s-35e, dry, TD 13,524 ft. in dolomite, anhydrite 1,750 ft., salt 1,881-3,190 ft., Yates 3,380 ft., Delaware 6,105 ft., Bone Springs 7,624 ft., Hueco 8,985 ft., Pennsylvanian 11,490 ft., Woodford 13,213 ft., Devonian 13,372 ft., elev. 3,689 ft.

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LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D. C. Notice is hereby given that the lands listed herein are offered through sealed bids on the terms hereinafter specified, to qualified bidders of the highest cash amounts per acre as a bonus for the privilege of leasing the lands under sec. 17 of the Leasing Act of February 25, 1920 (41 Stat. 437; 30 U.S.C. sec. 181), as amended. All bids must be submitted to the Director, Bureau of Land Management, Washington 25, D. C., on or before 1 p.m. of the date set out herein. Each bidder must submit with the bid one-fifth of the amount bid in cash or by certified check on a solvent bank or by money order made payable to the order of the Treasurer of the United States, and file the showing of qualifications to receive a lease required under 43 CFR 192.42 (b) and (c). The envelopes should be plainly marked that they are not to be opened before the date and hour set out herein, and should show the number of the parcel and the name of the field. No bids received after the hour fixed herein for receiving bids will be considered. The remainder of the bonus and the annual rental must be paid and an acceptable surety bond in the sum of at least double the amount of rental, but in no case less than $1,000 nor more than $5,000, must be furnished by a successful bidder prior to the issuance of a lease. An acceptable $5,000 surety bond will be required prior to commencing drilling operations on the land. The deposits of the other bidders will be returned upon acceptance of the successful bids. Bidders are warned against violation of section 59, U.S. Criminal Code, approved March 4, 1909, prohibiting unlawful combination or intimidation of bidders. The right is reserved to reject any and all bids. Royalties payable to the United States will be at the rate of 12½ per cent to 25 per cent for oil, and 12½ per cent to 16-2/3 per cent for gas, in accordance with Schedule B in the lease form. Annual rental will be at the rate of $1.00 per acre. The land is offered in one parcel described as SE¼NE¼ sec. 30, T. 36 N., R. 64 W., 6th P.M., Wyoming, 40 acres, and is within the known geologic structure of the East Lance Creek field. Bids must be submitted on or before 1 p.m., daylight saving time, Wednesday, July 14, 1948. Marion Clawson, Director.

CALENDAR

June

Society of Automotive Engineers, summer meeting, French Lick Springs Hotel, French Lick, Ind., June 6-11.

Western Petroleum Refiners Association, joint technical-industrial relations meeting, Broadview Hotel, Wichita, Kans., June 11.

Department of Manufacture and Department of Standards and Tests, National Petroleum Association joint meetings, Arlington Hotel, Oil City, Pa., June 14, and Emery Hotel, Bradford, Pa., June 15.

Pennsylvania Grade Crude Oil Association, twenty-fifth anniversary meeting, Hotel William Penn, Pittsburgh, Pa., June 17.

Rocky Mountain Oil and Gas Association, mid-year meeting of the board of directors, City Auditorium at Cody, Wyo., June 18-19.

Kentucky Oil and Gas Association, annual meeting, Hotel Lafayette and Phoenix Hotel, Lexington, Ky., June 17-18.

American Society of Testing Materials, fifty-first annual meeting, Book-Cadillac Hotel, Detroit, Mich., June 21-25.

American Petroleum Institute, Division of Production, eastern district meeting, Greenbrier Hotel, White Sulphur Springs, W. Va., June 30, July 1-2.

Canadian Gas Association, annual convention, Jasper Park Lodge, Jasper, Alta., June 30-July 3.

Petroleum Research Conference, sponsored by the American Association for the Advancement of Science, Colby Junior College, New London, N. H., June 28-July 2.

July

Third Annual Drilling Industry Safety Clinic, Baker Hotel, Dallas, July 6-7.

August

Appalachian Gas Measurement Short Course, eighth annual session, West Virginia University School of Mines, Morgantown, W. Va., August 30-September 1.

September

American Chemical Society, Division of Petroleum Chemistry, fall meeting, St. Louis, September 6-10.

The Instrument Society of America, third instrument conference and exhibit, Philadelphia Convention Hall, Philadelphia, September 13-17.

Pacific Coast Gas Association, annual convention, Hotel Casa del Rey, Santa Cruz, Calif., September 14-16.

October

American Institute of Mining & Metallurgical Engineers, petroleum division, fall meeting, Adolphus Hotel, Dallas, October 4-6.

American Association of Petroleum Geologists, midyear meeting, technical session and 3-day field trip, Pittsburgh, Pa., October 4-9.

American Gas Association, annual convention, technical section, Ambassador Hotel, Atlantic City, October 4-9.

National Lubricating Grease Institute, sixteenth annual convention, Edgewater Beach Hotel, Chicago, October 11-13.

American Association of Oilwell Drilling Contractors, eighth annual meeting, Rice Hotel, Houston, October 11-13.

Texas Mid-Continent Oil and Gas Association, twenty-ninth annual meeting, Fort Worth, October 14-15.

American Institute of Mining & Metallurgical Engineers, petroleum division, fall meeting, Elks' Club, Los Angeles, October 14-15.

November

American Petroleum Institute, annual meeting, Stevens Hotel, Chicago, November 8-11.

American oil Chemists' Society, fall meeting and technical sessions, Pennsylvania Hotel, New York, November 15-18.